May 2017

The Expansion of the Chalkidiki Olives into the U.S. Market

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The Expansion of

CHALKIDIKI OLIVES

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ABSTRACT

A GLANCE INTO OUR PROJECT

As a result of the stagnant domestic market, Greek olive producers are seeking to expand their exports within the United States. Using a mixed methods approach, we identified consumer consumption patterns as well as preferences for olives and packaging. We conducted in-depth interviews to learn how the production process affects the taste and texture of olives, and to understand where producers obtain their market intelligence and how they use that data. The project identified key factors that influence Massachusetts olive consumer preferences, assessed the ability and feasibility of producers to meet those preferences, and determined areas for further research.

ACKNOWLEDGEMENTS

Our team would like to express our gratitude to the following organizations and individuals for their help and contributions to this project:

Dr. Konstantinos Rotsios of Perrotis College for all of his help, guidance, insight, and organization of the multiple interviews and site visits for our project.

Professor Robert Hersh and Professor Michael Elmes of Worcester Polytechnic Institute for their assistance, guidance, and feedback during our project work.

Aris Kefalogiannis of GAEA, Constantinos Constantinidis and Elke Veenendaal of Pelopac, and Anegronou Kortessa and Tsamakdas Alexandros of Sithonia S.A. for their taking the time to inform us on the important olive industry information and for their professional insights on our project.

Dr. Konstantinos Tertivanidis for conducting the IOC taste test protocol.

Dr. Kyriaki Zinoviadou for all of her help and guidance with the taste test.

Dr. Tryfon Adamidis of Perrotis College for guiding us around the market and helping us to communicate with olive sellers.

Laura Robinson of Worcester Polytechinic Institute for her helping to organize our initial taste test and assisting with citations.

Mr. Davis and Mr. Calhoun and Ed Hyder for their assistance in understanding the American olive market.

Perrotis College and the American Farm School for allowing us to use their facilities during our stay.

Worcester Polytechnic Institute for establishing this project site and making this trip possible.

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The Importance of Table Olives in the Greek Economy

The cultivation and preparation of olives are central to Greek history and culture. Currently, with more than 142,000 producers, the table olive industry is responsible for 9.2% of Greece's agricultural exports. In the face of the economic crisis, the Greek table olive industry has continued to expand. Greece's GDP declined from 354.4 billion U.S. dollars in 2008 to 194.8 billion in 2016. Yet, the Greek olive sector increased its production from just over 60,000 tons to more than 200,000 tons in the last decade. The value of Greek table olive exports has increased 40% amounting to 405 million euros, while production has increased by 167% by volume in the same time frame (Mylonas, 2015).

Chalkidiki table olives, which come from the Chalkidiki peninsula in Northern Greece, are one of the most popular olives in Greece (approximately 50% of the the total table olive production) and Chalkidiki table olives, which come from the Chalkidiki peninsula in Northern Greece, are one of the most popular olives in Greece (approximately 50% of the total table olive production) and account for 43% of table olives exports (Rotsios, 2017). Chalkidiki olive producers seeking to increase exports face a number of challenges including limited knowledge of the U.S. market structure for table olives, minimal contact with major U.S. importers and distributors, and inadequate market intelligence about consumer preferences and customer segmentation (Gjekanovikj, Bizmpiroulas, & Rotsios, 2015).

The primary goal of this project was to assess consumer purchasing habits of table olives in Massachusetts, and to identify opportunities for Chalkidiki table olive producers and processors to increase exports to the U.S. market. To accomplish this goal, we determined the factors that influence Massachusetts consumer preferences for table olives and assessed the ability of Chalkidiki olive producers to meet American consumer preferences through a mixed methods approach.

BACKGROUND

CHAPTER TWO

Olives in Greece

The olive represents an essential aspect of Greek life, as well as an economic pillar during these volatile years. Odysseas Elytis, a famous Greek poet of the 20th century, describes the significance of the olive most eloquently:

"If you deconstruct Greece, you will in the end see an olive tree, a grapevine, and a boat remain. That is, with as much, you reconstruct her."

-Odysseas Elytis,
Nobel Laureate, Literature, 1979.

Greece is well-known as one as one of the premier table olive producing countries of the world. Over the last two decades, the worldwide production of olives has increased from a total of one million tons in 1991 to approximately 2.6 million tons in 2014 as seen in Figure 2.1. Between 2004 and 2014, Greece has increased its market share in world exports of table olives from 10% to 15%. (Mylonas, 2015)

This trend in growth can be explained in part by a growing interest in the Mediterranean Diet which has been found to reduce cardiovascular disease and cancer as compared to American and British populations (Sofi, Macchi, Abbate, Gensini, & Casini, 2013). These findings were examined in several studies, including one by Doctors Lagiou and Trichopoulou of the National School of Public Health in Athens.

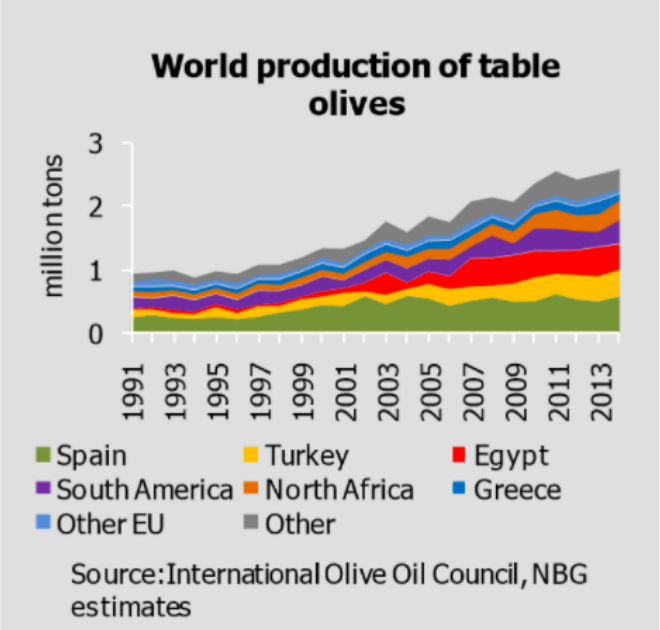

Figure 2.1: World Production of Table Olives (Mylonas, 2015)

They found that Greeks had lower mortality rates and higher life expectancy over people in non-Mediterranean countries, such as the United States and United Kingdom, despite Greece having worse health-care options and higher rates of smoking (Trichopoulou & Lagiou, 1997). The life expectancy for Greek men is 78 years, which is ranked as 20th in the World, whereas for American men it is 76 years, and ranked the 30th. Similarly, Greek women tend to live up to 83 years, which is ranked 20th in the world, versus American women who on average live up to 81 years, and ranked 33rd (NationMaster, 2013).

Researchers have claimed that the health benefits associated with the diet are from healthy, monounsaturated fats that reduce low-density lipoprotein cholesterol (the bad cholesterol that builds deposits in arteries) (Mayo Clinic, 2016). This interest in the Mediterranean diet coupled with globalization of food markets led to an increase in the consumption of table olives which Greece has been able to take advantage of. As indicated in

Figure 2.2 Greek table olive exports to major European markets, the USA, Brazil, Russia, Canada, Australia and Japan have increased between 2004 and 2013.

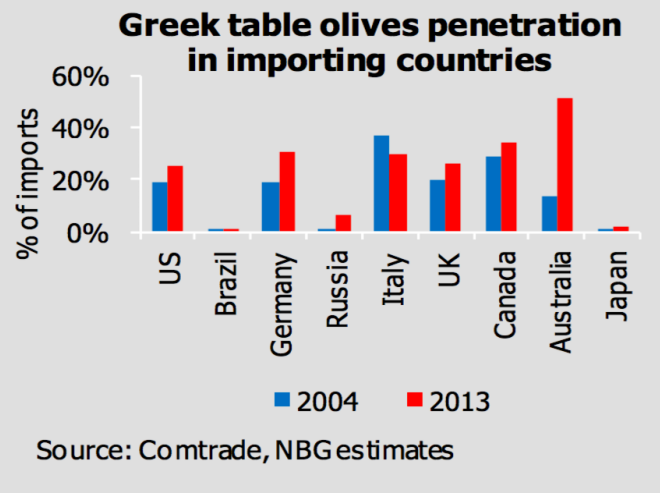

Figure 2.2: Import Percentage of Greek Table Olives by Country (Mylonas, 2015)

Despite this growth, the Greek table olive sector faces several issues. For instance, 75% of table olives are shipped in bulk form, losing €0.5 billion in profits if they had shipped branded olives (Mylonas, 2015). In addition, of the numerous varieties of Greek olives, the Kalamata is the only olive widely recognized by American consumers (DOEPEL, 2017).

Chalkidiki Region

There are a several areas in Greece that produce different types of table olives and olive oils as seen in Figure 2.3. The region we are focused on is the three-fingered peninsula highlighted in dark green, known as Chalkidiki.

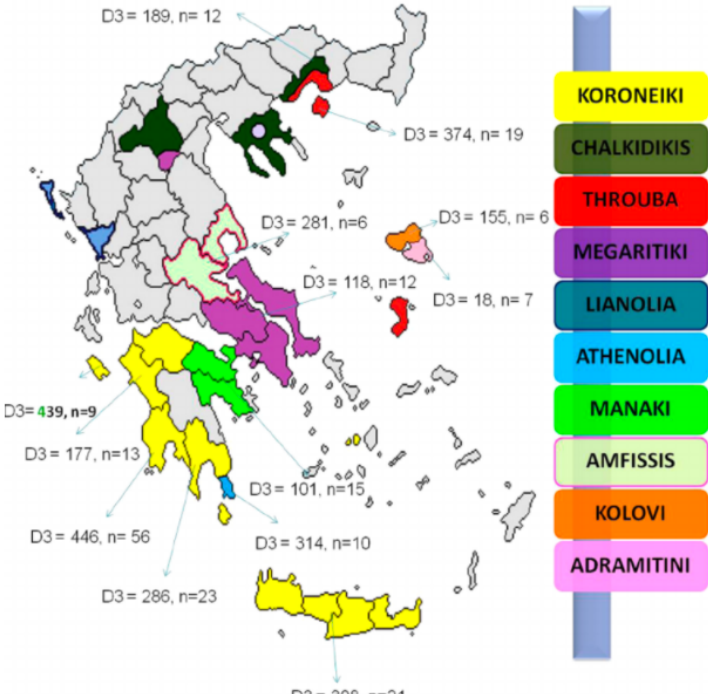

Figure 2.3: Olive Producing Regions in Greece (Karkoula, Skantzari, Melliou, & Magiatis, 2014)

According to a sectoral report published by the Inter-professional Organization for Greek Table Olives 2015, Chalkidiki olives make up 50% of the overall table olive production in Greece and, on average, 100,000 tons of these olives are

Figure 2.4: Chalkidiki Region

.produced annually (DOEPEL, 2017). The main region of production is Chalkidiki; however, they are also produced in Kavala, Eastern Macedonia. Approximately 6,900 km2 of land are used to cultivate the Chalkidiki olive and over 60 thousand producers live in the region. The olive variety also accounts for around 43% of Greek table olive exports and the value of the exported olives is approximately 280 million euros per year. In Chalkidiki, about 80% of the working population is involved in cultivating these table olives (Rotsios, 2017).

Greek table olive varieties

variety	% domestic production	producer price	region of production
Chalkidikis olives	50%	1.1	Chalkidiki, Kavala
Green olives	30%	1.1	Fthiotida, Fokida, Voiotia
Black olives		1.6-1.8	
Kalamon olives	20%	1.8	Lakonia, Aitoloakarnania, Fthiotida, Messinia

Table 2.1: Table Olive Varieties in Greece (Mylonas, 2015)

Challenges Faced by a Greek Cultivator

FARM SIZES

In each olive producing region, there are two types of producers: large-scale corporate companies focused on product volume, and smaller independent farmers that usually focus on first-level processing, handing over capital intensive activities such as bottling, branding, advertising and marketing to the more capable companies. (Illiopoulos et al., 2012)

Farm size and structure have a strong impact on the organization of the supply chain and profitability of farming. According to the National Bank of Greece (Mylonas, 2015), small olive groves (less than 5 hectares) are not profitable even if subsidies are included in the farm income. Moreover, olive groves of 5-20 hectares are profitable only after these subsidies are included in the farm income. Only farms larger than 20 hectares have shown to be productive and profitable with and without the subsidies, with profit margins of 34% and 6% respectively. (Mylonas, 2015)

DECLINING SUBSIDIES FOR THE EUROPEAN UNION

Despite attempts by the Greek government and the European Union to help keep this traditional part of Greek culture alive, independent farmers often struggle financially (Tzouvelekas, Pantzios, & Fotopoulos, 2001). The recent Common Agricultural Policy (CAP) reform requires the income subsidies per hectare of agricultural land to be equal, regardless of the type of farming, as opposed to the past regime of individual support for different products and their recent past production. In view of the fact that olive farming was among the highly-subsidized sectors, this new policy has had detrimental effects (Mylonas, 2015). Due to the small and dispersed nature of traditional Greek farms, there is a higher level of difficulty to achieving high profits, and an even stronger dependence on subsidies to achieve reasonable compensation for farmers. As a result, the net income of Greek table olive farmers is likely to decrease in response to thi snew policy. In Figure 2.5 the differences in net income including and excluding subsidies are apparent for different farm sizes.

The Greek market for table olives has become saturated and, to counter this, many olive growers and processors have begun to further pursue

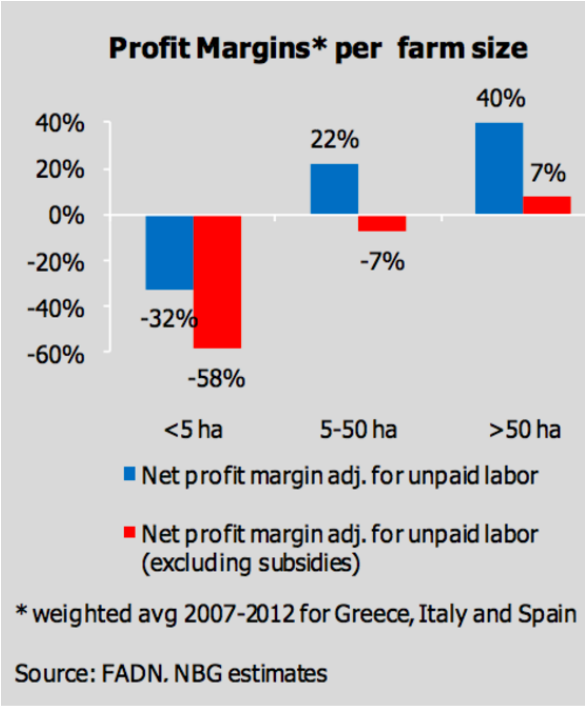

Figure 2.5: Profit Margins per Farm Size (Mylonas, 2015)

exporting their product to international markets (IOC, 2017). Lately, there has been increased interest in marketing table olives in the United States to consumers of medium to high income who are of a "high socio-cultural level" and who are aware of the health benefits and can afford to pay higher prices for specialty foods (Gjekanovikj et al., 2015).

ENVIRONMENTAL CONCERNS

Environmental concerns may also hinder the production of table olives in Greece. The most pressing environmental threats associated with olive cultivation are soil erosion and over-exploitation of water resources. Despite the rapid increase in production, many olive cultivators have not changed their practices to reduce erosion or runoff into bodies of water. Olive producers tend to use unnecessary amounts of water preemptively in order to maximize crop yield in the event of a dry season (Beaufoy, 2001). However, these methods can have a negative impact in the long-term cultivation of olives. In a 2006 study, traditional farming practices were compared with new practices specifically developed to combat soil and nutrient loss. It was found that traditional farming techniques applied on a large scale significantly eroded the soil itself and diminished the nutrients in the remaining land. The more modern methods, however, decreased both the erosion and soil degradation by an entire order of magnitude (Francia Martínez, Durán Zuazo, & Martínez Raya, 2006).

Table Olive Imports to the United States

The United States is a net importer of olive products and the consumption of these products has been steadily increasing over the past two decades. According to the United States Department of Agriculture Foreign Agricultural

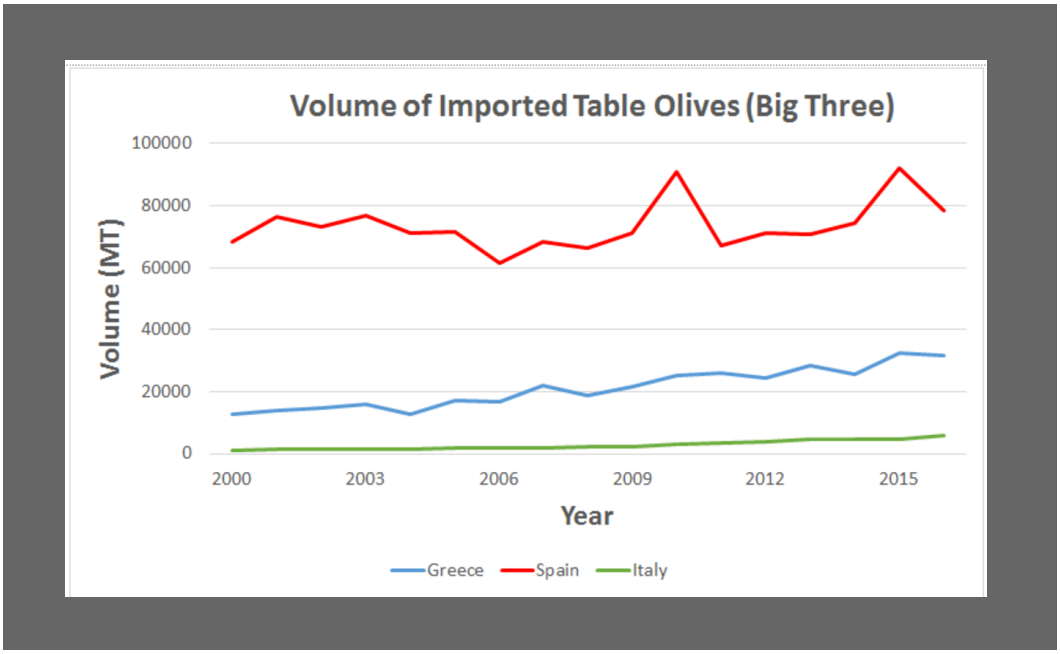

Figure 2.6: Table Olive Import Volume (USDA Foreign Agricultural Service, 2017)

Service (USDA Foreign Agricultural Service, 2017), 141,955 metric tons of table olives were imported to the United States in 2016, up from 78,227 metric tons in 1995. Of these olives, 75% originate from three major producers: Spain, Greece, and Italy. These three producers have steadily increased their olive exports to the United States as indicated in Figure 2,6. Spain, the largest exporter, increased exports by 10,000 metric tons in the past decade, whereas Greece has increased olive exports by 19,000 metric tons within the same time period.

The growth of the table olive imports was accompanied by a growth in value. As the Spanish exports to the U.S. increased, so did the import value. The Spanish exports increased in value by 65% of their original value, which indicates that they increased in value greater than their volumetric increase. Greek olive exports increased in value by 488% in the same time frame (USITC, 2016), and are shown to be a strong product with promising upward trends, indicating that there is space within the U.S. market for additional expansion.

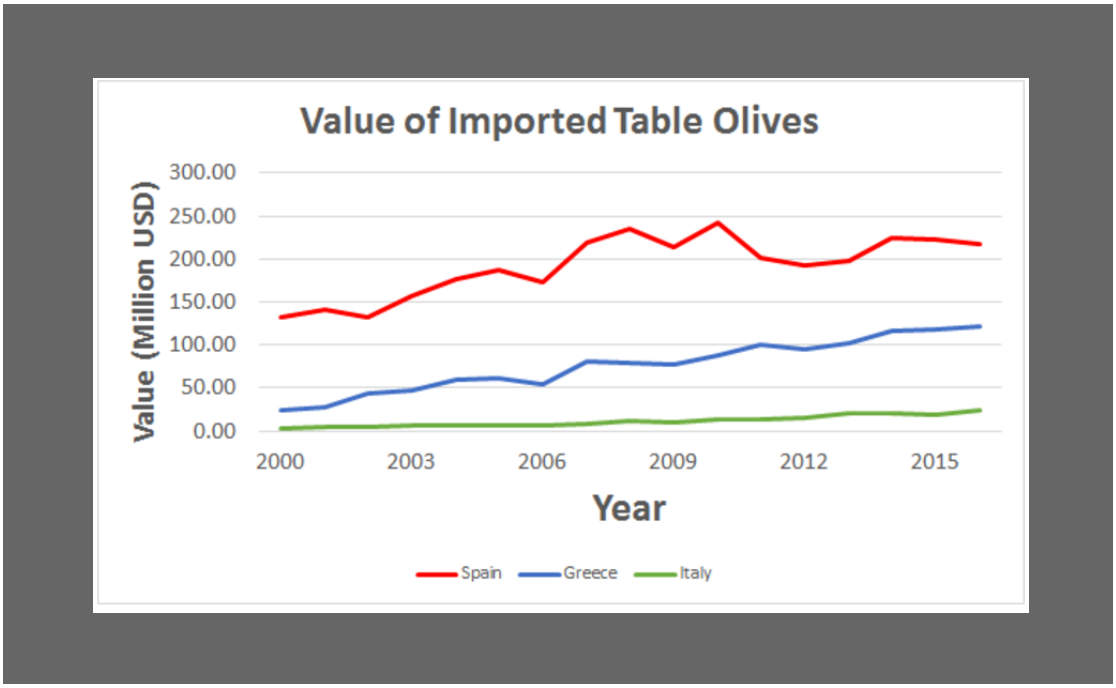

Figure 2.7: Value of Imported Table Olives (USITC, 2016)

Structure of the U.S. Table Olive Market

One important aspect of the table olive industry is the path through which olives reach the consumer. According to a publication by the International Olive Council and assembled by Datamonitor, the table olive market can be modeled on Figure 2.8. From the olive groves and cultivators, the olives are sent to factories that process and package the olives. The olives are then exported by the processor or a third-party exporter to the United States. An importer in the United States places the orders and determines what is brought into the United States and is overall responsible that the product is in compliance with U.S. food standards (FDA, 2017). The importer then sells the olives through several means, and some parties may play several roles.

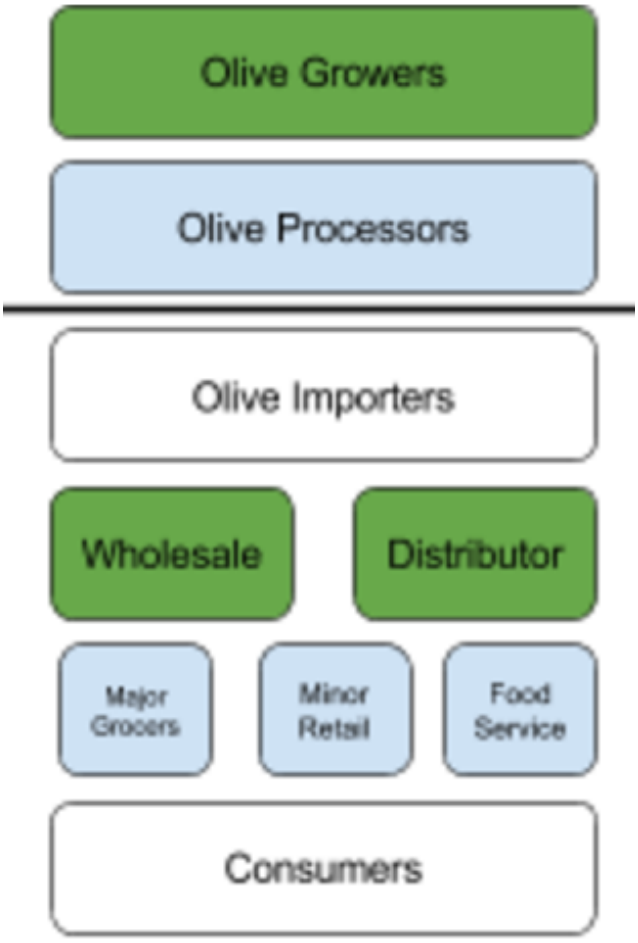

Figure 2.8: Table olive distribution in the United States (Datamonitor, 2010)

For instance, an importer could be a small-specialty food market that also distributes to local food-service establishments such as restaurants. Alternatively, the importer can be a large-scale distributor that sells to supermarkets.

Normally, however, the first place new food products usually appear is in restaurants. If the product sees success, then local markets might begin to sell it in small quantities. If the food item continues to gain popularity, it will be sold in specialty stores. At this stage, supermarkets might attempt to stock the product early on in its popularity and establish a relationship with producers before demand increases. After specialty stores, the product progresses to specialty retailers (like Trader Joe's and Whole Foods) and eventually to supermarkets if it is not already stocked (Calhoun & Davis, 2017). As a result, the product would follow the path shown in Figure 2.9.

Figure 2.9: Path of New Products in Retailers

This process of how olives reach the American consumer is a lengthy one that demonstrates there are several levels of stakeholders involved in the olive industry that must be satisfied in order for olives to be commercially successful in the United States (Lynch & Rozema, 2013).

Barriers to Expanding U.S. Imports of Chalkidiki Olives

Several barriers also play a role in table olive purchases regarding consumers, as seen in Table 2.2. The first of these barriers is lack of marketing and in-store visibility. The majority of olives sold are in jars and cans located in condiment aisles, away from the periphery of the supermarket. This placement limits consumer exposure to olives. Another barrier is the lack of convenience compared to other snack foods such as carrots, crackers, and cheese. Olives are typically preserved in a brine, making them messier and not an everyday snack. These factors limit olives to association with special occasions and holidays. As an added barrier, the fermentation process of olives gives them a high sodium content. In America where the current diet trend is low-sodium oriented, this could prevent the successful expansion of olives within the market (DATAMONITOR, 2010).

Finally, a specialty store owner in the Massachusetts area informed us that there has been a general increase in the consumer population purchasing olives, indicating that more Americans are willing to try olives. However, consumers tend to buy fewer olives than in the past, indicating that, while the amount of consumers has increased, the amount of olives sold per customer is decreasing (personal communication, Ed Hyder, February 15, 2017).

Key Barriers – Table Olives

Barriers	Factor description
 Lack of Recent News in Basic Shelf-Stable Olives	• Lack of marketing, innovation, and in-store visibility combine to keep olives as a minor category in supermarkets • The shelf presence of olives is small and is located in the middle of the store, away from fresh offerings so the category can be difficult to locate in a big grocery store or supercenter
 Lack of Convenience Versus Other Snack and Party Foods	• Other snacking foods have enjoyed recent innovation for easier snack consumption and resulted in shifts in consumer habits. (i.e. baby carrots as a snack food, string cheese) • Foods for entertaining are also more convenient with pre-made trays widely available (i.e. vegetable or cheese / meat trays in grocery stores, prepared dips, variety of chips.) Olives are not typically part of these offerings
 Entertaining and Holiday Image	• The seasonality of olive retail sales (high Q4) indicate that olive-serving is restricted to holidays and entertaining • Many consumers tend to associate olives with special events and entertaining which can limit their everyday usage • Olives used to be part of a standard relish tray that was served for entertaining or special meals, but this tradition has lost favour
 Sodium content	• Sodium levels are one of the barriers to usage cited by non-users in the consumer survey • Overall, consumers are bombarded with messages to cut sodium from their diets
 Taste polarization	• Unlike other food categories, the taste of olives is a major a barrier to consumption amongst a large proportion of the population • Canadians are not nearly as positive towards tables olives as Americans, but even in the USA, there is still a large number of consumers who will not consume olives in any form

Table 2.2: Consumer Preference Barriers in the United States (Datamonitor, 2010)

Consumer Preferences in Shopping for Traditional Food Products

Predicting consumer preferences and willingness to pay is difficult because of the number of variables that contribute to consumer preferences. These preferences can be influenced by attributes of the product such as shape, size, taste, texture, color, aroma, package, etc., and elements referring to label, name and available nutritional information. According to Fishbein (1967) and Lancaster (1966), consumers relate a product with a set of attributes, considering several features of the product in order to build an ideal model of preferences (Matsatsinis, Grigoroudis, & Samaras, 2007).

The Food Related Lifestyle construct (FRL) proposed by BrunsØ and Grunert (1995, 1997) distinguishes the different types of consumers; it covers five interrelated aspects: ways of shopping, quality aspects for evaluating food products, cooking methods, consumption situations, and purchasing motives (Brunsø & Grunert, 1998). The FRL instrument then differentiates consumers in five different groups: adventurous, careless, conservative, rational, and uninvolved food customers. In Table 2.3 the description of each of these types of consumers can be found. This kind of study analyzes the psychological factors of consumer preferences and helps to explain what type of consumers are most likely to be targeted by a specific producer or seller. However, there are three main factors that influence consumer's purchase decisions. Two are economic factors which are linked with affordability and type of product (need, commodity, luxury) and the third is functionality which concentrates on the consumer's needs, specifications and requirements and how these are perceived for each product (Herald, 2008).

A study by Steptoe, Pollard, and Wardle examines the following additional categories that affect how people select foods: "health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity and ethical concern" (Steptoe, Pollard, & Wardle, 1995). Even though price is an important factor and is considered by some as the foundation of the purchasing decision of a consumer (Herald, 2008), it tends to be a secondary factor when all other consumer needs are met. Imported table olives, particularly of the Greek variety, tend to be expensive, so they must be marketed in ways that they appeal to these other categories.

Types	Description
Adventurous	- More interested in all quality aspects of food than consumers in other segments. - They enjoy eating with friends at home and outside home. - They like to try new things and are always up for a new brand/different product.
Careless	- Least interested in the shopping for food and has little or no interest in cooking, much less in planning food related tasks. - These consumers feel time pressure.
Conservative	- Older than average - Organic foods and anything new is least interesting to this consumer in comparison with consumers in other segments.
Rational	- Self-fulfilment in food is important to those in this segment. - They like preparing meals and value all quality aspects of food. - They plan shopping and meals, read advertisements and product labels. - They consider price more than other types of consumers.
Uninvolved	- Uninterested in anything related to food

Table 2.3: Five Types of Consumers (Uimonen, 2011)

PACKAGING

Packaging is a source of product recognition; it serves as an extrinsic quality cue which provides consumers with information about brand image and lifestyle (van Dam & van Trijp, Hans C M, 1994); (Eldesouky, Pulido, & Mesias, 2015). Since it makes the first impression on the consumer, it "is useful to understand how consumers perceive innovative foods, what their expectations are, which packaging they find most attractive and what information positively affects the purchasing decision and the acceptability of present or potential consumers" (Kähkönen, Hakanpää, & Tuorila, 1999).

There are several attributes that can be directly associated with packaging. As stated by Eldousky, Pulido & Mesias (2015), "consumers seem to care for several packaging features such as easiness to open and close, resealability, adequate package size and transparency of packaging material." Consumers value convenience and they tend to select products that can be resealed easily. In addition, consumers tend to avoid buying packages that contain more product than they can reasonably consume before expiration.

With the emergence of upscale supermarket chains such as Wegmans, Whole Foods, and Trader Joe's there has been a shift from the usual packaging of olives in jars or cans to specific refrigerated olive bars that are located closer to the fresh fruit and vegetables. A report in 2008 shows that 22% of shoppers reported that their local supermarket had an olive bar, which was an 18% increase from 2006 (Datamonitor, 2008). According to this study, the olive bar is an excellent place for producers and retailers to introduce new varieties of olives because, unlike packaged olives, they provide the convenience to customers to purchase as much or as little as they want.

Different packaging methods have been used in the table olive industry such as glass jars, cans, and plastic containers/bags, and recently snack pouches. In addition, olives have been offered as in-store delicatessens - packaged on site in small cups - offering the same benefits to the producer, retailer, and consumer of olives (Datamonitor, 2008).

Furthermore, olives are, for the most part, exported in bulk to the U.S. and are then packed in the area by domestic bottlers and packagers.

"Persuasion has become a kind of force. The more the advertiser knows about what consumers want, and the more desires the product and packaging seek to fulfill, the more coercive the force."

-Virginia Postrel

Another important factor in consumer preference is quality. There has been an increasing trend around the world of consumer demand for higher quality foods. This is especially true in countries with a high average income and greater education levels, in communities that place an emphasis on health and nutrition, and in technologically developed areas where information about food products is easily available (Regmi, Ballenger, & Putnam, 2004).

Further product quality cues include whether a product is organic, the use of pesticides and other chemicals, as well as sodium quantity and calorie count may influence consumers to opt for healthy products (Zarkin & Anderson, 1992).

A common way in which producers can communicate product quality is through display of the country of origin (COO). Country of origin or "country image" refers to the reputation that goes along with products of a specific country. Past studies have revealed that generally consumers evaluate products and make choices based on COO (Bilkey and Nes, 1982). Grebitus, Colson, Facendola (2011) and Bergamin (2016) also conclude that consumers value geographical origin labels, and the value that they give to these labels increases proportionally with the informational content regarding the quality of each product.

IDENTIFYING CONSUMER PREFERENCES FOR OLIVES

Evaluating olive attributes and consumer preferences is a two part process: the characteristics of the olives must be rated both objectively and subjectively. In 2012, Yilmaz and Aydeniz performed a sensory evaluation on four different types of green table olives. They first measured the olives' salt content, pH value, oil content, titratable acidity, and texture. Taste tests were then performed with two different groups. A panel of knowledgeable and regular olive consumers described and measured the appearance, aroma, and flavor and texture properties in accordance with the standard methodology of the quantitative descriptive analysis. Next, consumer preferences were evaluated with a survey given to 50 consumers. They were provided with a list of hedonic values, a scale from 1 to 9 (1 being dislike extremely and 9 like extremely) to rate the different types of table olives. Results show that consumers tend to value mouth-feel over appearance and flavor, which means table olive processors should take this into account when they select and supply their products in the market (Yilmaz & Aydeniz, 2012).

A similar study conducted by the Mondavi Olive Center at UC Davis gave conflicting results. USDA inspectors were trained in quality and flavor standards, and then asked to evaluate table olives originating from California, Egypt, Morocco, Portugal, and Spain. The attributes assessed included taste and smell, appearance, and texture and mouth-feel. Unlike the previous study however, "Flavor (taste and smell) was the main driver of consumer preference versus appearance, texture and mouth-feel" (Lee, Kitsawad, Sigal, Flynn, & Guinard, 2012). These contradictory results serve to reinforce how unpredictable consumer preferences can be. Individuals tend to react to particular experiences that cause contextual cognition and result in specific response behaviors which lead them to buy and think in a specific way. Factors that affect this behavior are age intervals, location, sex, income, education level, and a number of socio-demographic components. (Bashar, Ahmad, Wasi, 2012)

Even though both studies had an expert panel and a certain quantity of table olive consumers, the sample varieties were different. The first study had four different types of green olives, while the second one had 20 samples of black ripe olives. In addition, the protocols of the tastings vary in each study and the type of olive used for tasting is different. Even though both studies used hedonic scales, Yilmaz and Aldenis developed 16 attributes to describe appearance, flavor, mouth-feeling and aroma while USDA inspectors developed 34 attributes with the same objective. These accumulated factors create overall differences between the tests.

Figure 2.10: Olives in cups from the taste test

Perrotis College and Chalkidiki Olive Growers

Our project is a result of a collaboration between Worcester Polytechnic Institute, and Perrotis College. Perrotis College is focused on promoting agricultural education and committed to helping farmers and food entrepreneurs to become professionally accomplished in the latest aspects of agriculture, ecology and life sciences, and to make Greece and its neighbors a better place (AFS, 2017).

A study undertaken by our sponsor Dr. Konstantinos Rotsios and two colleagues suggests that, based on interviews with seven olive exporters in Greece, Chalkidiki olive growers, processors, and exporters have limited knowledge about the market for table olives in the United States. In the next chapter, we lay out our project goals and our research approach.

"The mission of the institution is to educate youth and adults to become professionally accomplished in the latest aspects of agriculture, ecology and the life sciences, and to make Greece and its neighbors a better place."

-Perrotis College

METHODOLOGY

CHAPTER THREE

The primary goal of this project was to assess consumer purchasing habits of table olives in Massachusetts, and to identify opportunities for Chalkidiki table olive producers and processors to increase exports to the U.S. market. To achieve this goal, we identified three objectives:

1. Identify and understand the factors that influence consumer preferences for olives in Massachusetts

2. Assess the ability of Chalkidiki olive producers to meet American consumer preferences

3. Identify the challenges faced by Chalkidiki olive producers both domestically and abroad

Objective 1: Identify and understand factors that influence consumer preferences for olives in Massachusetts

This section of the study assessed consumer preferences towards table olives in Massachusetts, with a focus on Greek Chalkidiki olives. The main methods of research were a blind taste test, a pile sorting exercise, and a Qualtrics survey.

The blind taste test was conducted at Perrotis College with a panel of 15 Americans. This test was based on a recognized method by the International Olive Council to perform sensory classification of table olives according to the extent of any defects, descriptive gustatory attributes (saltiness, bitterness, acidity), and kinesthetic sensations (hardness, crunchiness, and fibrousness) (International Olive Council, 2011). In order to recruit participants for this test, we used a non-probability approach technique called convenience sampling. Convenience sampling is a type of nonrandom sampling where members of the target population that meet certain criteria, such as being easily accessible, geographically proximate, or available at the right time and willing to participate, are participants in the study (Etikan, Musa, & Alkassim, 2015). As such, participants included students and faculty members that heard about the test and were available to participate.

The tasters were trained by Dr. Konstantinos Tertivanidis, an International Olive Council certified member, and Dr. Kiriaki Zinoviadou, a professor at Perrotis College, on how to taste and rate the olives based on a standardized protocol. According to this protocol, olives are to be rated based on factual attributes, not on appeal. The attributes were separated into kinesthetic sensations (hardness, crunchiness, and fibrousness) and gustatory sensations (saltiness, bitterness, acidity), and were rated from 1-11 according to the intensity of the measured attribute. To train the participants, Dr. Terivanidis and Dr. Zinoviadou provided participants with several standards to compare to. For each of the abnormal fermentations, a small, dilute cup was made for participants to smell, allowing participants to identify each. A sample of a soft cheese and carrots was used to represent hardness. A slice of granny-smith apple and pineapple were used to represent fibrousness. Finally, pieces of mango and celery stalk were used to compare extremes of crunchiness.

In addition to the objective scale, the participants rated each olive subjectively according to a hedonic nine-point scale. We asked participants in the taste test to rate the

Figure 3.2: Students buying olives from the market in Greece for the taste test

appeal of each attribute since our purpose was to identify American consumer preferences.

Each gustatory and kinesthetic category was ranked ranging from 1 (dislike extremely) to 9 (like extremely) and then each olive was rated based on its overall appeal. A blank space was provided to provide any further comments. The metric used for this taste test can be seen in Appendix A.

Five different types of olives were tasted. The olives selected were of Greek origin and consisted of three types of olives from Chalkidiki (cracked green, large green, and salt-brined black olives), Kalamata olives, and Amfissa olives. The three different Chalkidiki olives were selected for the test because they represented three different ways that the olives could be prepared.

This assortment of olives collectively displayed a wide array of characteristics ranging from mildly to very: bitter, salty, and chewy. By using olives with similar attributes, we hoped to be able to identify common factors in olives that consumers preferred. After the sensory assessment, we asked participants which olives they would purchase to determine which olive characteristics were the most preferred in order to determine the most influential factors on the buying intention of consumers. To analyze the multivariate data, we created radar graphs of the multivariate data and frequency distributions to identify what attributes were favored by participants (Panagou, 2012).

In addition to the taste tests, we wanted to better understand how different packaging options (e.g., cans, jars, olive bars, pouches) influence consumer attitudes about the quality and attractiveness of olives. Visual package elements are known to play a role in affecting consumer buying decisions and research indicates that producers can persuade consumers to purchase specialty food products, such as table olives, through product packaging (Wang, 2013). To identify successful packaging methods, we used photographs from 26 table olive products currently in the U.S. market in a pile sorting exercise involving 20 students from the United States. Pile sorting is a method used to identify themes in a cultural domain ("Pile sorting." 2013).

The participants were told to sort the images into piles however they saw fit and were then asked to explain the criteria used to sort each image and describe what attributes were used to devise the separate groups. Using visual ANTHROPAC, a cluster analysis was performed to see the closeness of the items and the characteristics unique to each cluster's theme.

To expand our research into what factors influence consumer preferences, market segmentation, and how olives are consumed in the Massachusetts market, we designed and conducted a Qualtrics survey. The survey was also distributed to the WPI student and faculty population as well as on Amazon Mechanical Turk to target the Massachusetts region. 302 participants took our survey, 33 of whom were from Amazon Turk and then rest were from the WPI community. The survey in Appendix B consisted of socio-demographics questions and olive preferences questions based on our research, and was supplemented by input from professionals within the Greek olive industry.

Objective 2: Identify ability of Chalkidiki olive producers to meet American consumer preferences

The primary purpose of our project on site was to understand the perspective of the Chalkidiki olive producers and exporters and to learn more about their current production practices, their perspectives of the U.S. market, and their ability to innovate to meet the demands of the U.S. market. We collected this data through two site visits and three semi-structured interviews with exporters and processors.

We conducted site visits to an olive exporting facility and olive processing facility: Pelopac and Sithonia S.A. to learn more about production practices and how changes in processing affect the taste, texture, and nutritional content of olives. During the site visit, team members asked about the effect of each production step on the quality of the final olive product in order to draw connections between processing options and the olive qualities preferred by participants in the taste test.

We carried out several semi-structured interviews, as they can be used to gain insights on how people think and get a more profound knowledge in a subject (Cohen & Crabtree, 2006). Thus, the interview focused on the extent to which organizations were interested in creating or adapting products for American preferences. Permission was obtained to record the interviews to use direct quotations in our report.

Our first interview was with Aris Kefalogiannis, the CEO of GAEA. The company was a startup in 1995 and was created with the intent to put a variety of quality, authentic Greek products in the international markets. Today, the company is 82% exports and 18% domestic sales. Their main products were olives and olive oil but they have expanded into a greater variety of products with a continued focus on olives. GAEA's most important olive products are Kalamata and Chalkidiki varieties. This company created olive snack pouches, which are pouches of olives without liquids, preservatives, heat treatments or additives and an ambient life of 12 months.

Our second interview was with Constantinos Constantinidis, the Managing Director of Pelopac, and Elke Veenendaal, Pelopac's Business Development Associate. Pelopac was founded in 1983 by Sotiris Kitrilakis. Originally, Sotiris began with a brand called Peloponnese which won an award from the National Specialty Food Association as the best grocery brand in 1990. They seek to provide more consistent and quality products to their customers. Pelopac was eventually founded to supply Peloponnese and other clients. Pelopac is a unique business that produces products for specific customers, whereas other companies generally produce a product and export that product to distributors. Because of their relationship with their customers, Pelopac tailors each product to what their customer company requires for their consumers. The very nature of the company therefore is to change their product in order to meet consumer preferences.

The third interview was conducted with Sithonia Olives S.A., a family-owned business involved in cultivating and processing Chalkidiki olives. We talked with Mrs. Kortessa Anegronou and Mr. Alexandros Tsamakdas, in-laws who work together at the company. Sithonia was founded in 1997 by Kortessa's father and uncle (both farmers) who decided to process the olives that were cultivated on the family's farm. Sithonia is now a supplier to larger companies, such as Pelopac, and the types of olives produced include whole, pitted, and hand stuffed Chalkidiki olives. Being a medium sized company, they have the capacity to process 3,000 tons of olives.

"The Greek olive is the best olive in the world."

- Greek olive market vendor, 2017

Figure 3.4: Students after touring an olive processing facility

Objective 3: Identify the challenges faced by Chalkidiki olive producers both domestically and abroad

In addition to the ability of these olive producers to meet American preferences, it was also important for us to comprehend some of the challenges that these companies face producing olives and interacting with foreign markets. During our semi-structured interviews with these companies, we asked a series of questions related to their interactions with American consumers and their own challenges domestically. Through these interviews, we obtained critical information regarding the olive industry from the perspective of processors and exporters. These questions focused on decisions regarding cultivation, reasons for business decisions, and their overall experience in dealing with foreign markets, particularly the United States. Prior to each interview, background research on the company to be interviewed was conducted to better tailor questions to their operations. A full interview schedule for the companies interviewed can be found in Appendix C.

Figure 3.5: Olive groves behind the Sithonia processing plant

FINDINGS

CHAPTER FOUR

In this chapter, we present our data and analysis to identify table olive preferences and consumption patterns from our taste test and survey. We also discuss the perspectives of Greek olives producers and processors about the opportunities and challenges to expand in the U.S. market.

Factors that influence consumer preferences for table olives in Massachusetts

Demographic Information

We received 302 responses to our survey with the following breakdowns:

- Adults older than 50 made up the majority of the study (38%). The age groups 41 - 50, 31-40, and 18-24 were approximately evenly represented at 19%, 16%, and 17% respectively.
- A vast majority of the surveyed population was white (89%), followed by Hispanic or Latino at 5.8%, Asian at 2.4%, African American at 0.7%, American Indian or Alaska Native at 0.34%, and Other at 1.7%.
- The majority of participants were female at 66% and 34% were male.
- A large portion of our participants was educated with 75% holding an Associate's degree or higher and another 18% of participants currently attending college.
- Over half of our participants' annual household income was over $100,000.

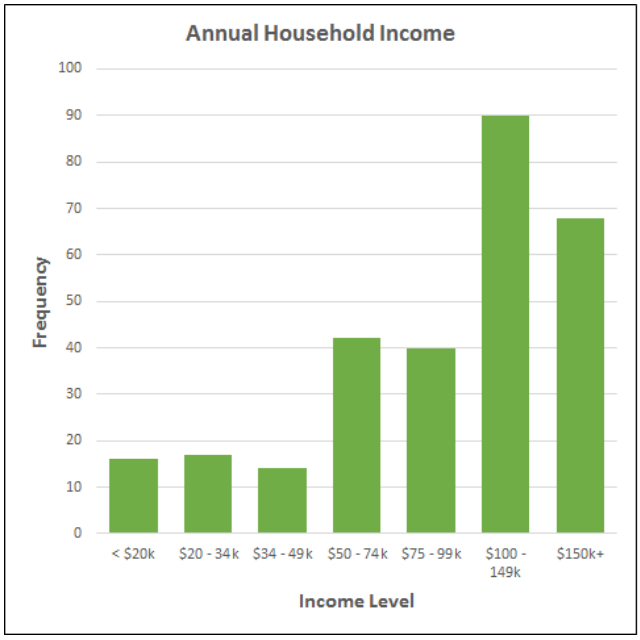

Figure 4.1: Annual Household income

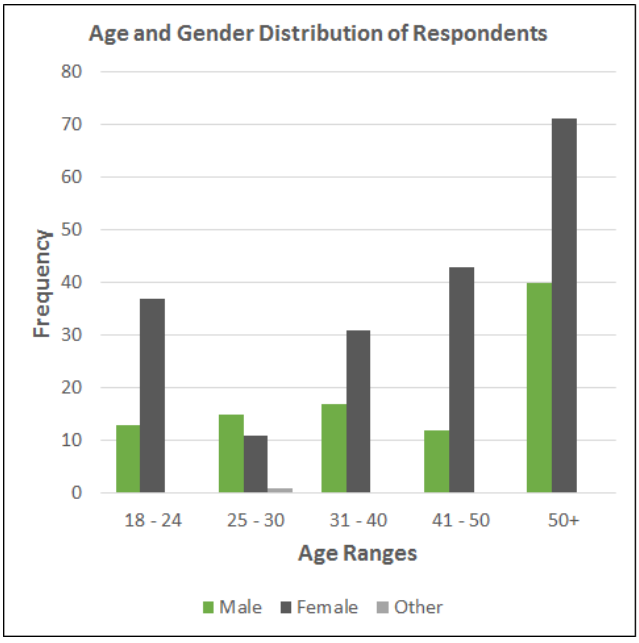

Figure 4.2: Gender and Age Distribution

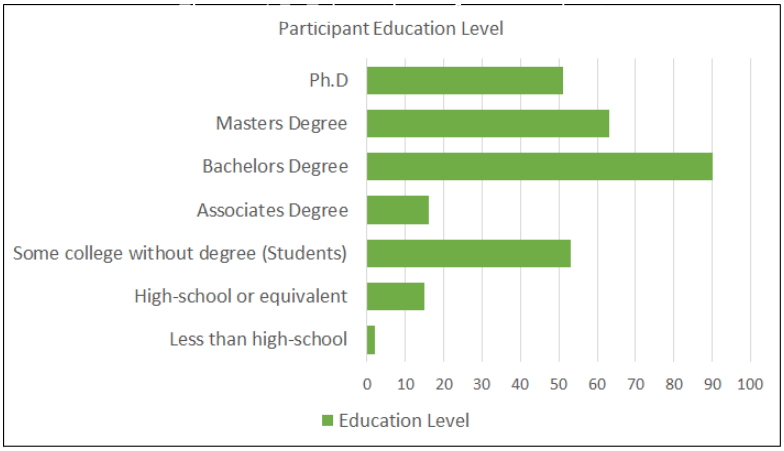

Figure 4.3: Education Level Distribution

HOW DOES CUSTOMER SEGMENTATION INFLUENCE OLIVE PURCHASES?

The FRL framework discussed in the background chapter can be used to identify lifestyles of subgroups, such as habits of purchase, preparation and consumption of products. For instance, an interesting way to cluster subgroups is by the incidence of their purchasing habits for olives and the type of consumer they are. Overall, 51% of our sample are adventurous consumers, 27% are rational, 17% are carefree, 5% are conservative and 1% are uninvolved.

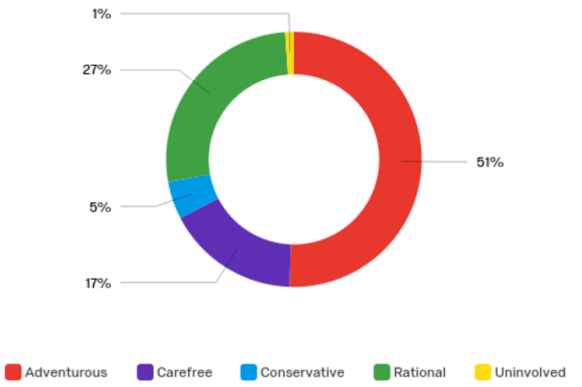

Figure 4.4: Percentages of Types of Consumers of Respondents

HOW OFTEN ARE OLIVES PURCHASED?

From our entire sample, most respondents purchase olives monthly (41%) or only for special occasions throughout the year (35%). A minority of respondents (11%) are frequent olive consumers, purchasing olives weekly, and another small population never purchases olives (14%).

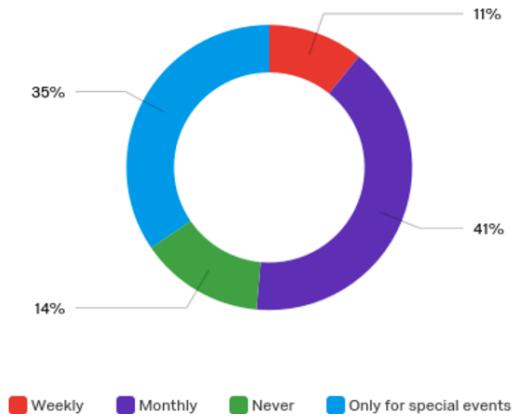

Figure 4.5: Frequency of Olive Purchases of Respondents

HOW OFTEN DO DIFFERENT TYPES OF CONSUMERS BUY OLIVES?

As seen in Figure 4.6 adventurous and rational consumers buy olives are more likely to buy olives on a weekly basis than other groups, while adventurous and conservative consumers have the highest incidence of monthly purchases, at 48% and 46% respectively, followed by rational consumers with a 36%. In addition, adventurous consumers have the least incidence of never purchasing olives (8%), followed by carefree consumers (17%). This implies that adventurous consumers is the segment that is most likely to buy olives, even though they follow different consumption patterns as we explain below.

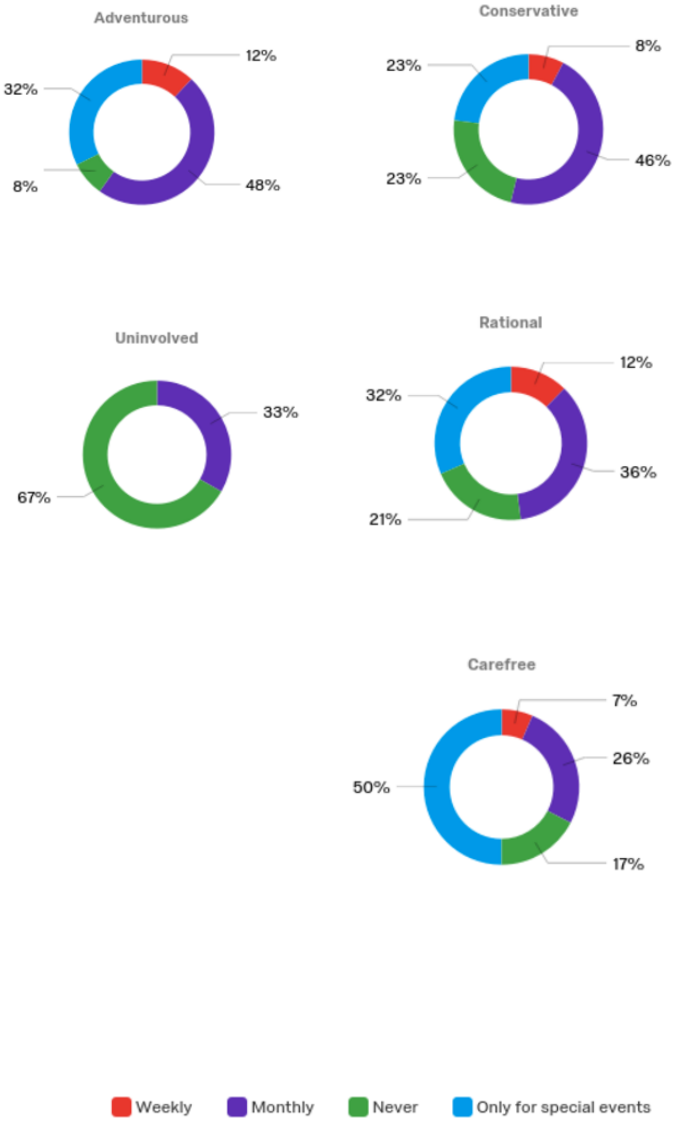

Figure 4.6: Frequency of Olive Purchases Based on Different Consumer Types

HOW DO MASSACHUSETTS CONSUMERS EAT OLIVES?

In this section, the selection of the options was not mutually exclusive; however, most of the respondents claimed to eat olives in salads and alone as a snack. Thus, according to our survey, 191 respondents said they eat olives in a salad and 173 respondents eat olives as a snack. This was followed by on pizza (126), in pasta (106), in spreads (69), on tacos (65), olives in sandwiches (55) in cocktails (53), and then other (47). In the "other" category, people listed other ways to eat olives which were: cooking in dishes, on nachos, and in vegetable platters.

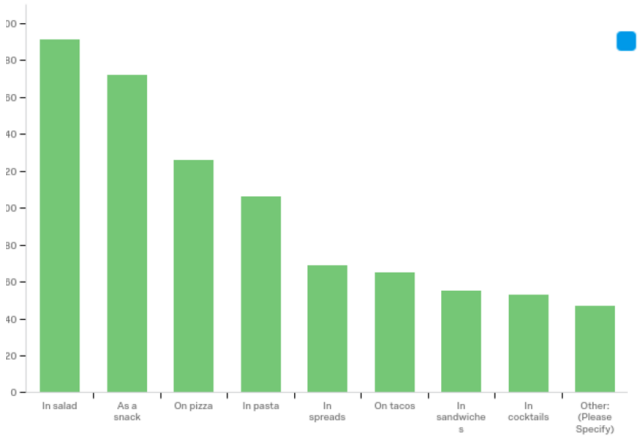

Figure 4.7: Bar Chart of How Respondents Consume Olives

WHERE DO CONSUMERS BUY THEIR OLIVES?

Respondents also answered from where they most often purchased olives. A majority of respondents (61%) said they purchase olives from large supermarkets such as Shaws or Pricechopper. Twenty-one percent of respondents purchased olives from specialty markets such as Trader Joe's and Whole Foods. Participants indicated that 9% shopped for olives at Other stores, 5% at discount retailers such as Walmart, and 4% at delicatessens. No respondents purchased olives at convenience stores.

The responses to this question were broken out by how often the consumer buys the olives in order to gain a better understanding of from

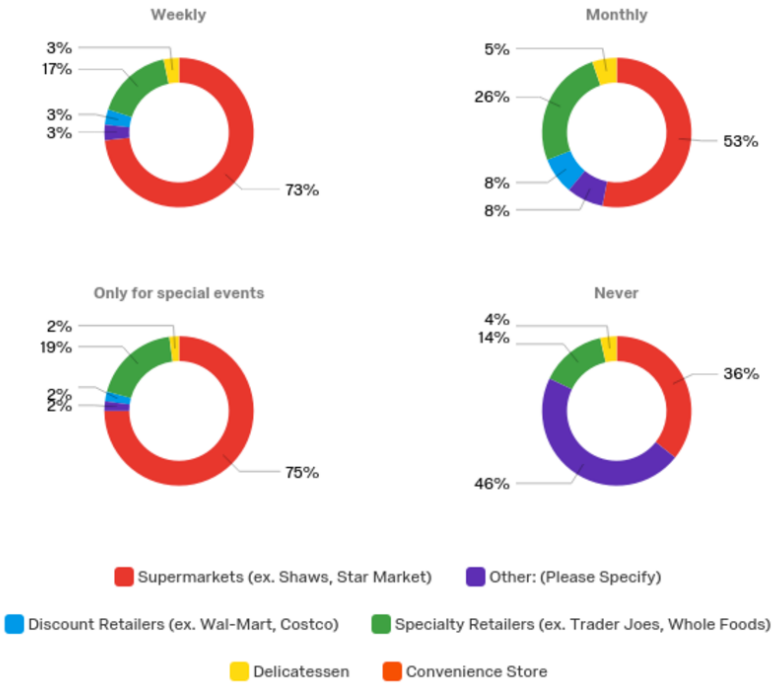

Figure 4.8: Where Olives are Purchased based on Purchasing Frequency

where the frequent consumers of olives purchase. The very frequent olive shoppers purchase them a surprising amount from supermarkets and less from delicatessens and specialty markets. The monthly olive purchases have the most diverse habits, shopping at specialty markets and delicatessens much more frequently than any other group.

WHAT OLIVE TYPES ARE MOST WELL-KNOWN?

Respondents were asked to list every type of olive they are familiar with. The word cloud below, Figure 4.9, displays the frequency of the responses. Larger fonts of the words relate to a higher frequency. As seen, Kalamata is the largest word in the cloud. We found that the Kalamata olive was the most widely known with 52% of participants indicating they know of them while about 1% of respondents listed the Chalkidiki olive (alternative spellings were included in this analysis).

Figure 4.9: Word Cloud of Olive Types from Respondents

WHAT TYPES OF OLIVES ARE PREFERRED?

When asked, how do consumers prefer their olives, 70% of consumers responded without the pit, making it the most widely accepted preparation. All other styles of preparations were chosen by about a quarter of the sample, indicating that they are less preferred than the pitted.

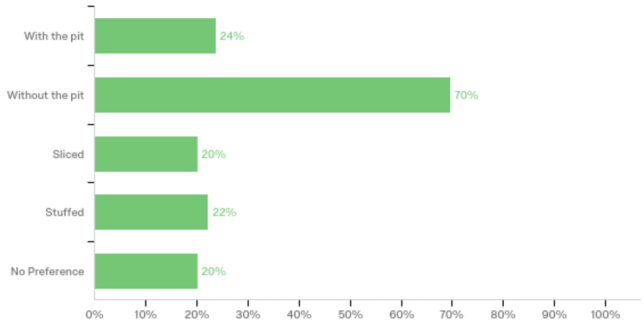

Figure 4.10: Olive Preparation Comparison

FACTORS THAT INFLUENCE PURCHASES OF KNOWN AND UNKNOWN OLIVE VARIETIES

We discovered that sensory properties are of high importance to consumers. We asked participants to what extent certain factors would motivate them to purchase a new variety of olive. We found that the physical appearance of the olive was a dominating factor with 86% of our participants responding that it would probably or definitely motivate them to try a new olive. Price was the second most important factor at 72% of the population rating it as definitely or probably would and the lack of artificial preservatives was third with 60% of the population rating it as "probably will" or "definitely will".

The factor that would influence consumers the least when it comes to buying a new type of olive was country of origin with 32% of the consumers in the "definitely would not" or "probably will not".

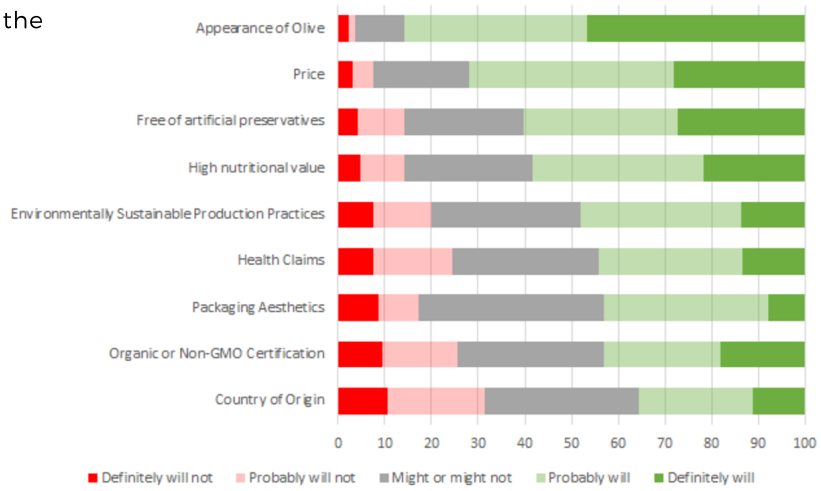

Figure 4.11: Breakdown of Factors that Motivate New Olive Purchases

Participants were asked to rank the importance of several factors when considering purchasing a known variety of olive. Thus, they rated the factors from one to nine; one being the most determining factor and nine the least one. Results can be seen in Figure 4.12 and Figure 4.13. The horizontal axis shows the six factors ranked in the top three and bottom three and the vertical axis shows the frequency the term was ranked. The individual bars above each factor are the nine ranks. For example, 94% of participants ranked taste in their top three attributes that influenced olive purchasing decisions followed by freshness and then price. The three factors consistently ranked at the bottom are packaging aesthetics, origin, and organically produced products. Fifty-six percent of participants ranked packaging aesthetics, 48% ranked organically produced, and 49% ranked origin as the bottom three slots.

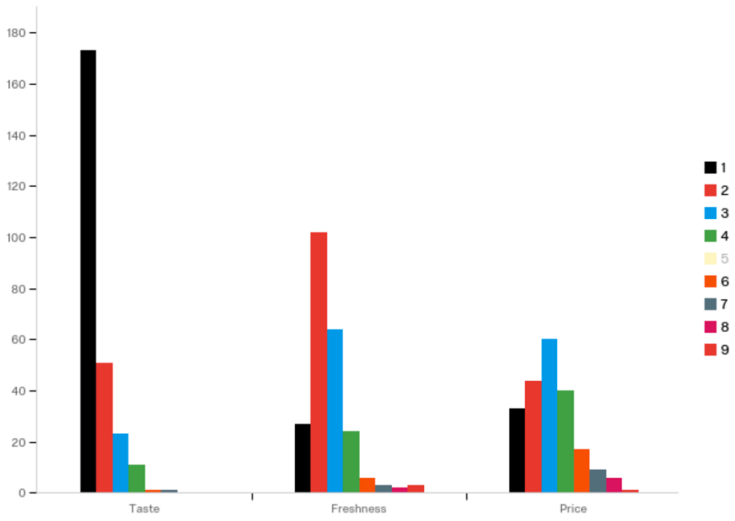

Figure 4.13: Top Ranked Factors for Known Olive Purchase

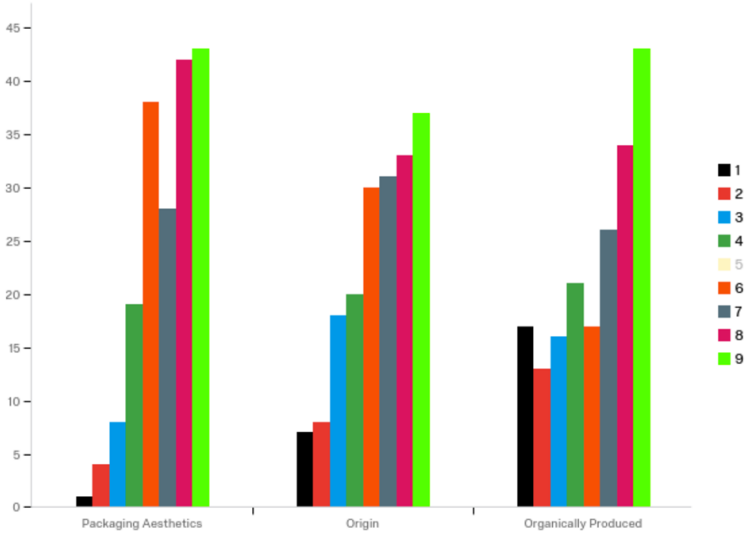

Figure 4.12: Bottom Ranked Factors for Known Olive Purchase

Taste Test Results

The blind taste test we performed was used to discover the taste and texture preferences of the participants, all of whom were either studying or working in Massachusetts. The median rather than the mean was used to create radar charts for each olive to avoid extremes from outliers in the data set. The radar charts show an objective taste and texture map of each olive. On each point of the hexagon in the charts is an attribute that was rated: crunchiness, saltiness, bitterness, acidity, hardness, and fibrousness. Starting at the outside hexagon, the corresponding numbers are ten, then the proceeding inner hexagon is eight, then six, four, and two. The numbers correspond to the objective rating of the attributes from the 1-11 scale. A rating of 11 meant the attribute was highly apparent in the olive, and a rating of 1 meant the attribute was absent. In Figure 4.14, the radar charts for each of the olive varieties can be viewed.

The olives created five unique taste and profiles. The saltiest olive was labelled as the large Chalkidiki rated as a 7 and the least salty was the salt-dried Chalkidiki with a rating of 4. The three other olives were rated in between at 5, 5.5, and 6, indicating moderate levels of saltiness. The bitterness had a wider range in objective ratings. The large Chalkidiki was rated the lowest at a value of 3 whereas the cracked Chalkidiki was the most bitter at a 7. The Amfissa was also on the high-end of bitterness with a rating of 6.5. Acidity had the narrowest range of ratings in the gustatory sensations with the lowest being the large Chalkidiki at 3 and the highest being the Kalamata at 5.

Kinaesthetic perceptions such as hardness, fibrousness, and crunchiness were more a polarizing metric. The ranges of hardness, fibrousness, and crunchiness ratings were 4.5, 2, and 4 respectively. Respondents ranked the Amfissa olive as the least hard at 2.5 and the cracked Chalkidiki as the hardest at 7.

Respondents ranked the large Chalkidiki and the Amfissa as the least fibrous at 4 and the salt-dried Chalkidiki as the most fibrous at 6. Finally, the tasters rated the Amfissa olive as the least crunchy at 2 and the cracked Chalkidiki as the crunchiest at 7.

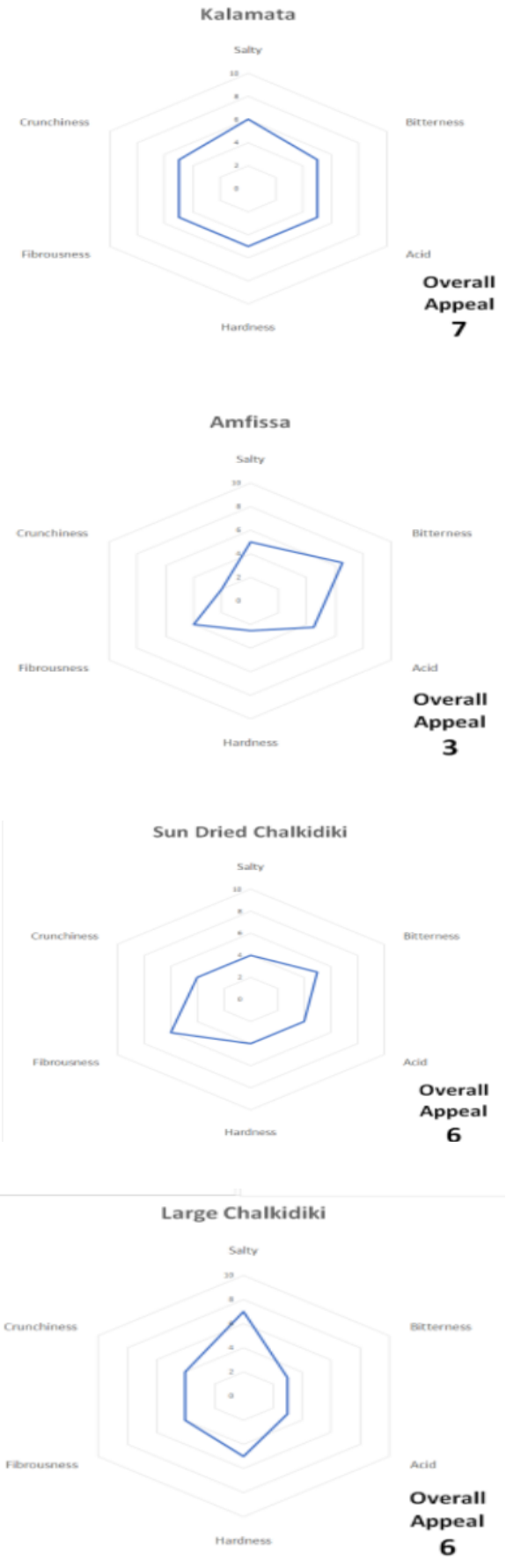

Figure 4.14: Taste Test Radar Charts

From our interviews with olive processors, we established that these three primary gustatory sensations can be altered with different processing techniques as long as they are within food safety standards. To provide a more detailed analysis, we examined how participants in the taste test ranked salinity, bitterness, and acidity for each of the olives.

SALINITY

Salinity in the taste test was defined as the taste produced by dilute solutions of substances such as sodium chloride. Of the five olives tested, the Kalamata was rated the highest median appeal for salinity at “Like Moderately”, where 66% of the participants rated the salinity as “Like Slightly” or better. This indicates that the Kalamata olive which had a salinity level of 6 was of agreeable saltiness to the largest population. The least accepted olive in terms of salinity was the cracked Chalkidiki with a median salinity appeal of 4 ("Dislike Slightly") where 60% of our sample rated the salinity from "Dislike Moderately" to "Indifferent". Yet, the cracked Chalkidiki registered a 5.5 salinity level-extremely close to the Kalamata salinity level.

To explore this issue further, we looked to the three other olive varieties which had intermediate salinity appeal ratings. The salt-dried Chalkidiki variety had the lowest salinity rating of 4 and was evaluated as being “Liked Slightly” or better by 53% of our sample. The large Chalkidiki olive ranked higher in salt content at a score of 7, the highest of the five olives. This was met with a rating of “Like Slightly” or higher by 60% of the sample. Finally, the Amfissa olive, rated at a median salt content of 5 was rated as being “Indifferent” by the median, but was “Liked Moderately” or greater by 46% of the panel and only “Disliked Slightly” to “Disliked Very” much by 33% of the sample size.

Our data set appears to indicate that an olive with a similar saltiness to the Kalamata would be the most agreeable to the Massachusetts consumer, however saltiness was not a clear determining factor when it came to the overall appeal of the olives.

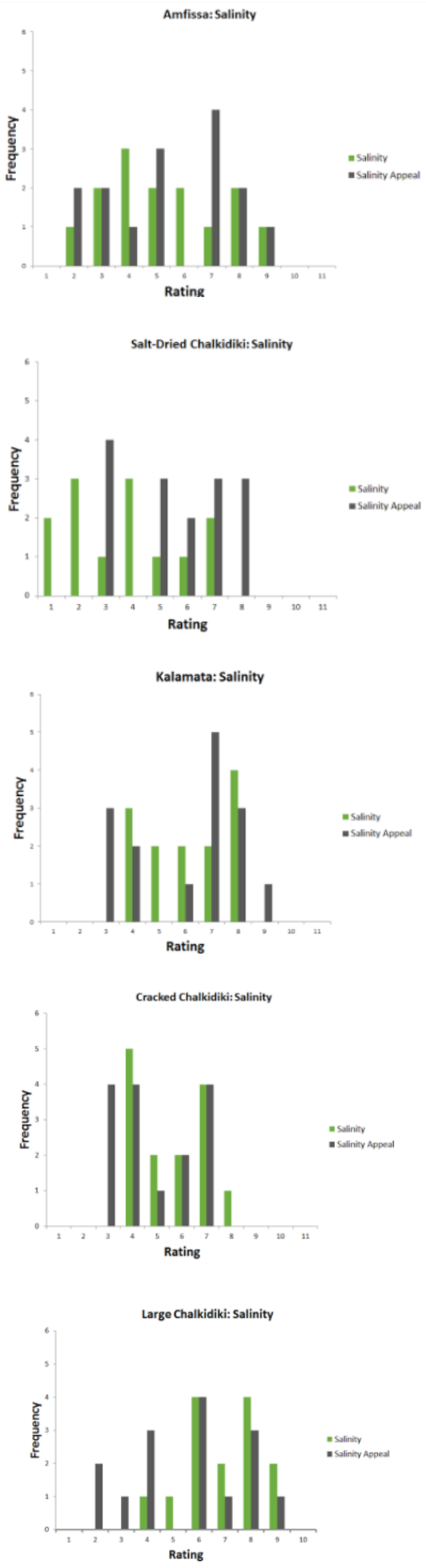

Figure 4.15: Salinity Distributions

BITTERNESS

Bitterness, which in the taste test was defined as the taste produced by diluted solutions of most acid substances such as quinine and caffeine, strongly affected appeal as shown by the cracked Chalkidiki and Amfissa olives. The cracked Chalkidiki's bitterness ratings were largely weighted towards the higher end, with 66% of participants rating the bitterness above a 6. This higher bitterness rating was disliked by the sample and 66% of the participants rated the bitterness as "Disliked Slightly" or worse at a median value of "Disliked Moderately". The large Chalkidiki was ranked low on bitterness (a median value of 3) and had the highest median appeal of "Liked Slightly". This indicates that the higher bitterness of the cracked Chalkidiki had a negative effect on the appeal of the olive. Further supporting this trend is the Amfissa olive that scored a 6.5 in bitterness (the second highest amongst the olives) and was met with a corresponding appeal rating of "Disliked Slightly". The two olives of moderate bitterness, the salt-dried Chalkidiki and Kalamata were rated as "Indifferent" and "Liked Slightly" respectively. According to our taste test data, appeal and bitterness have an inverse relationship.

ACIDITY

Acidity in the taste test was defined as the taste produced by diluted solutions of most acid substances such as tartaric acid and citric acid, Most of the distributions here did not have a decipherable pattern and thus could not provide an accurate measure of the olives' acidity ratings, however, the appeal category can still be used to determine which olive was most well-liked by our sample. The most appreciated olives in terms of acidity were the Kalamata and salt-dried Chalkidiki. The Kalamata olive had 66% of the sample rate of "Like Slightly" or better in this attribute, and only 20% of the sample in the "Dislike" range. The salt-dried Chalkidiki olive had a smaller acceptance of 53% of our panel and was weighted more heavily towards the "Like Slightly" category whereas the Kalamata was weighted towards the higher acceptance rate. The least accepted olive in terms of acidity was the Amfissa olive which scored a moderate score of 4.5 in terms of acidity and over half of the participants disliked the olive's acidity.

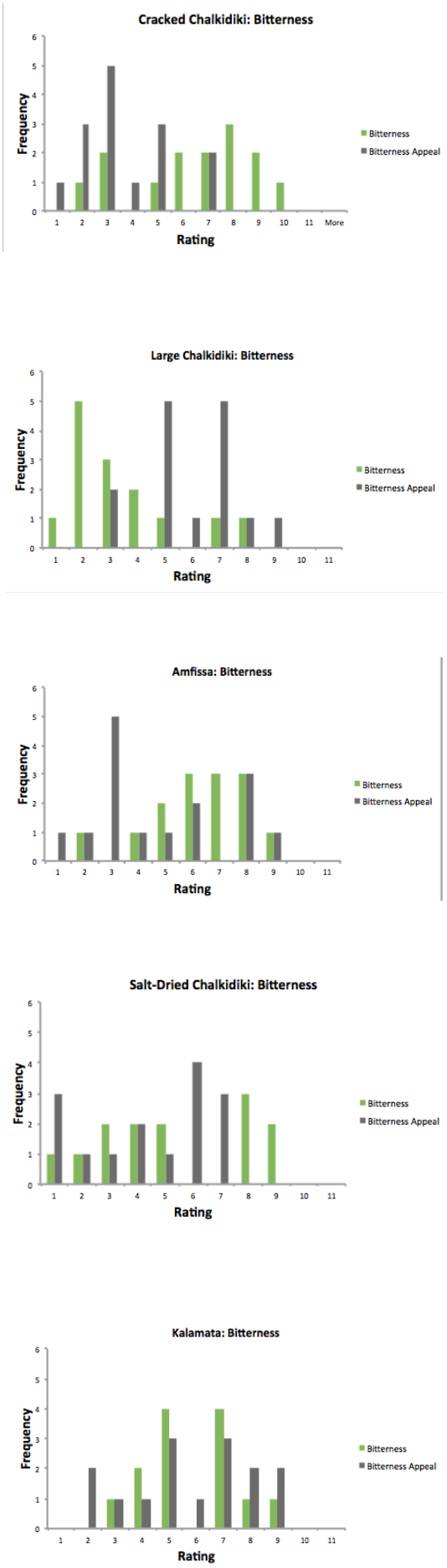

Figure 4.16: Bitterness Distributions

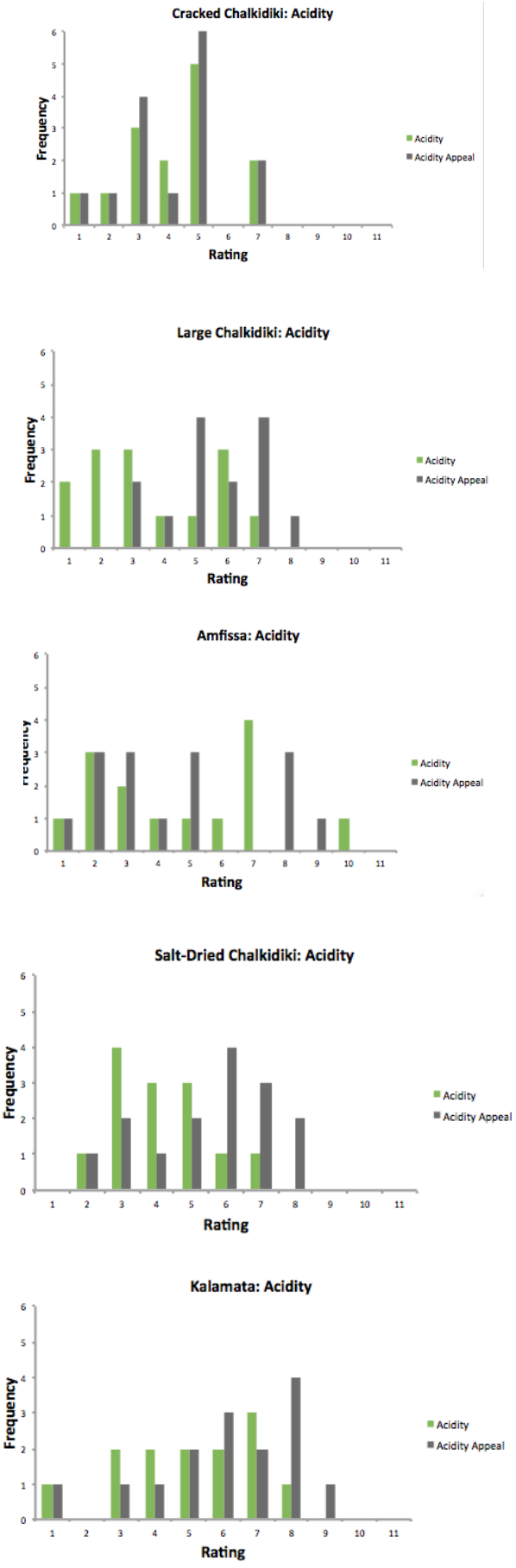

Figure 4.17: Acidity Distribution

Influence of Packaging on Consumer Olive Preferences

According to the survey, packaging plays a secondary role in consumer preferences to the sensory categories of the olive itself. However, packaging was linked with several other factors that affect consumer perception of the olives such as freshness and convenience.

The pile sort exercise was used to identify consumer perceptions of different types of olive packaging. Participants sorted 26 photographs of different types of olive packaging however they thought fit. A visual cluster analysis (multidimensional scaling) was employed to see the related closeness of each of the items and the likelihood of one item appearing in the same pile as another pile across participants to identify clusters. We asked three questions at the end of the pile sort to see what the participants viewed as the most expensive, least expensive, and which pile appealed most to them as a consumer. Each individual who completed the exercise had unique and different descriptions for their piles, but some items were always grouped similarly.

Four clear thematic clusters emerged according to the material of the packages:

1. Glass jars

2. Plastic containers

3. Olive bars

4. Cans, snack pouches and bulk containers.

Each cluster represents similar descriptions given by participants that show how participants perceive the different types of packaging materials and their importance. After coding each of the interviews, determinant characteristics for each cluster were identified. Table 4.1 highlights the described characteristics of the products from each cluster.

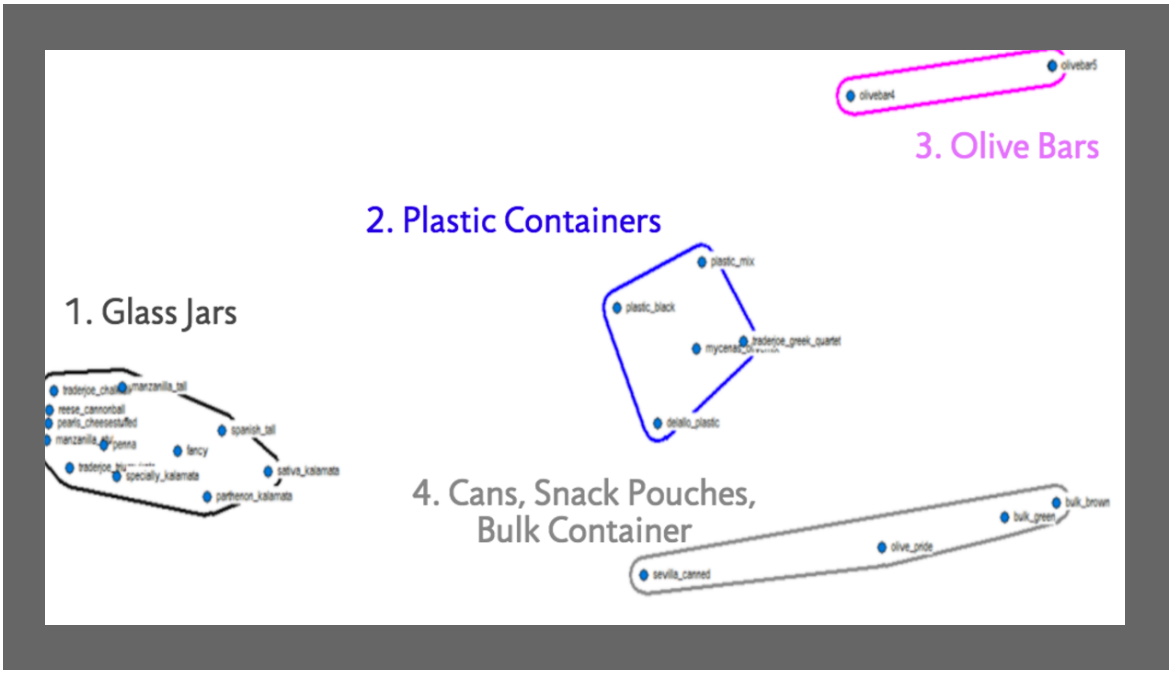

Figure 4.18: Multidimensional Scaling clusters of table olive packaging

Glass jars	
• Usually completely transparent • Positive aesthetic appeal • Lid allows extended preservation when coupled with refrigeration • Closed industrialized container seen as hygienic • Perceived as a higher-end product • Perceived as high in preservatives	
Plastic Containers	
• Usually completely transparent • Associated with health threatening plastic chemicals • Perceived as basic and cheap to the consumer eye • Perceived as a low-end product	
Olive bars	
• Assumed to have fresh olives • Seen as unhygienic • The brine, colors and the shapes of the olives can be clearly seen • Pick different types of olives and make own mix	
Cans/ Snack Packs/ Bulk Containers	
• No transparency • Usually portrayed as cheap and effortless. • Not resealable • Poor quality	

Table 4.1: Distinct packaging characteristics by identified clusters

For each of the clusters, participants chose which type of packaging they found the most appealing to them as a consumer. Sixty-five percent preferred the glass jars, 30% preferred the open-air market style, 5% preferred the plastic containers, and no one preferred the last category.

GLASS JARS

According to our pile sort and discussion, the reasons why the majority of our participants preferred glass jars is because they highly value characteristics such as transparency, resealability, and hygiene. We found that people are more likely to buy an olive product if they are able to see the package content. In our survey, 41% of the participants preferred olives packaged in a jar. Despite being perceived as more hygienic, consumers also believe this type of packaging contains a less fresh product compared to the open-market olive bars. Similar comments and thoughts by participants revealed that jars are associated with high preservatives in order for the product to last longer on grocery store the shelves. In relation to resealability, the online survey revealed 31% of people consider resealable packaging is very important, and 46% of the sample said it was important, but not a determining factor. Lastly, consumers reported that the labeling on the jars could either portray a high-end product, or a low quality item.

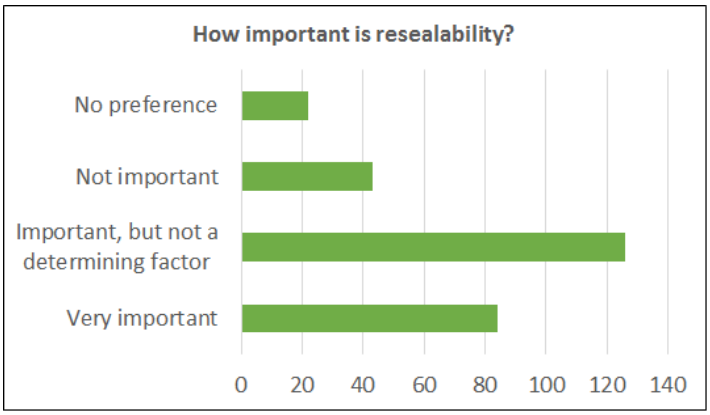

Figure 4.19: Importance of Resealability

Finally, the product out of the entire 26 pictures associated with the highest cost was the glass jar with the lid wrapped in paper and twine, as seen in Figure 4.20. It was described as “the most ornate or flashy packaging” and simply “really nice”.

PLASTIC CONTAINERS

The second cluster of plastic containers was generally disliked. Even though the material allowed consumers to see the olives, it did not appeal to participants. They were described as lower quality and basic, and poorly designed. Participants commented on the risks of plastic containers relating to chemicals leaking into the food. Supporting this perspective, some participants in the survey said that they avoid foods in plastic containers.

OLIVE BARS

Olive bars were in general associated with freshness, but participants specifically stated that they would only buy these olives in foreign countries where they would be more confident in the freshness, cleanliness, and safety. One participant explained “if I’m in Greece, I would definitely buy these ones [olives from an olive bar] just because I know that they’d be fresh. But if I was in Stop and Shop and I saw that, I’d probably stay away from it because… they’ve probably gone a really long way.” Another participant described the open-air olives as “not as sanitary.” Even though olive bars allow consumers to see the product, pick the varieties, and make a personalized mix, these concerns in our study are supported by other findings in the literature about the declining popularity of olive bars (Datamonitor, 2010). In our interviews, we found that even the Greek companies acknowledge the tendency of supermarkets to neglect their olive bars, claiming that employees working at big retail stores are not as focused or motivated to keep these bars clean. This makes olive bars unattractive, and potentially unhealthy. Although this perception came up in the pile sorts, still 22% of people surveyed preferred olive bars when asked about preferred packaging. Out of the percentage of people who preferred olive bars, 75% of those respondents identified with the adventurous consumer profile.

Figure 4.20: Packaging Associated with Highest Cost

CANS, SNACK POUCHES, AND BULK CONTAINER

Cans, snack pouches, and bulk olive packaging were usually negatively perceived and were the least preferred due to the opaque packaging. From our survey, 6% of people preferred cans and only 3% preferred the snack bag. One participant from the pile sort exercise who grouped the containers in this manner said, "I would probably stay away from these ones because it just looked really cheap, like they skimped out on the packaging, what else did they skimp out on?"

Another noted canned olives "just looked kind of boring in terms of labeling and they might taste good, but I would never know because I would never buy them because of how they look on the outside".

In our survey, of the participants that have seen olive snack pouches in stores, 66% of them would not purchase the snack pouches citing the inability to see the olives.

We found that different types of consumers choose different types of packaging. Thirty-eight percent of people who would buy olives in olive bars were adventurous consumers, followed by 18% of consumers that belonged to the rational segment. One-hundred percent of the people who said they would buy olives in snack pouches were adventurous consumers.

Nevertheless, most of the respondents would buy olives in glass jars. Table olives have been sold in jars for decades, and a shift from this traditional packaging material to other types would require a long and well thought out marketing campaign.

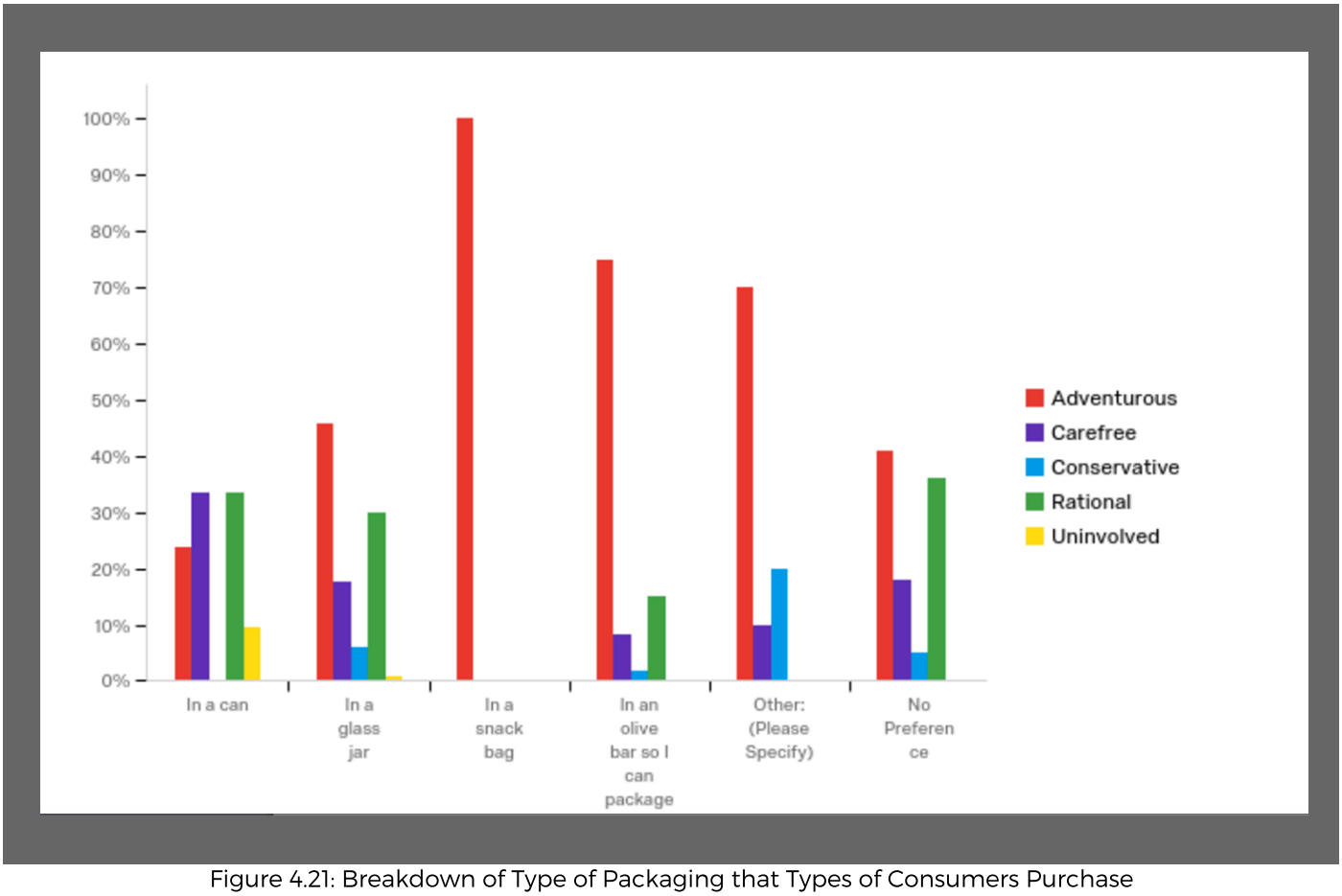

Figure 4.21: Breakdown of Type of Packaging that Types of Consumers Purchase

Ability of Chalkidiki olive producers to meet American consumer preferences

During the site visits, we learned that there are several processing steps that can be changed to produce an olive that will meet consumer preferences in different markets. Sithonia S.A. indicated that they send different sized olives to different markets and can alter the color of their Chalkidiki olives to align with different national preferences. For example, in Germany, the consumers prefer a larger, more yellow olive while in Italy a small, greener olive is preferred. Sithonia believed that this is because in Italy, an olive growing country, more people were familiar with the type of olive that was grown domestically, which tended to be smaller and greener. Germany, which does not have domestic olive production, learned about olives from Turkey so they olives tended to be large and more yellow.

The interviewees hypothesized that American consumers would prefer a more yellow olive that was very large and either pitted or hand-stuffed, because, like Germany, the U.S. lacks an olive growing tradition. In our survey, we asked participants to choose between a yellow-green olive and a dark green olive and found conflicting results. These conflicting results enhance the limited knowledge of American consumer preferences.

When participants were asked to pick which olive appeals to them more, Olive A or Olive B as seen in Figure 4.22. Seventy-nine percent of our survey participants preferred the darker green olive, Olive B. Many participants cited the color as the primary reason for choosing Olive B. The lighter yellow-green olive, Olive A was seen as less fresh and described as 'sickly' by several participants, whereas the dark green olive was viewed as healthier and fresher. According to a few participants, Olive A appeared as though it was left out in an olive bar and Olive B was preserved in a jar, lending to its better color.

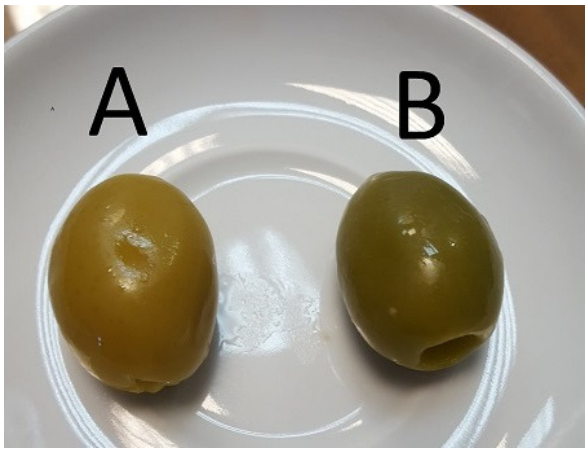

Figure 4.22: Olive Comparison Used in Survey

Although the taste of the olive can be changed, alterations sometimes have tradeoffs that must be considered. For example, during the fermentation process, olives are immersed in lye baths to be debittered, and olive will become saltier and the acidity will increase. The fermentation process, which is controlled by brine and acidity levels (5% salt, 4.5 pH), can be lengthened or shortened to change sensory qualities of the olive.

Apart from the color, the size, and the taste of the olive, Sithonia can adapt their methods of stuffing to meet different types of market preferences. For example, some markets demand the product with stuffing inside the olives, while others prefer it to be outside and apparent. For this purpose they use two types of methods, mechanical and hand stuffed. The hand stuffed olives are much more expensive, as they are considered a premium product, compared to the automated stuffed olive.

Furthermore, we also learned that companies like GAEA and Pelopac are looking to reach a new consumer segment and to redefine olives as more of a snacking product by using an innovative type of packaging.

After exploring the trends and forecasts for the olive market in the United States, GAEA recently introduced olive snack pouches which contain olives that are rich in fiber, low in preservatives, low in additives and non-pasteurized. This absence of pasteurization means that the olives retain their healthy probiotic cultures. Probiotics are microorganisms that are believed to have beneficial health qualities when consumed, so this probiotic claim can add value to the product. In addition to these advantages, the pouch has an ambient shelf life of 12 months. GAEA claims to have noticed an increasing trend for healthy snacks in the United States and believes olives processed and packaged in this way fit this profile.

Pelopac has adapted this idea for its own use and is similarly attempting to market and sell olives as an alternative healthy snack. The company strongly believes that by expanding this type of packaging, it will reach a different market segment and increase its market share in the U.S. Pelopac understands that only the regular olive consumers are going through the olive aisle in grocery stores, whereas infrequent olive consumers are more likely to buy the snack packs if they are displayed in a different manner, such as hanging next to complementary food products such as beer or wine. In addition, Pelopac believes that the convenience of this packaging might be highly valued by consumers due to its resealability, an aspect that we confirmed in our survey in which 31% of respondents said that resealability was a very important factor for olive purchases and 46% said that resealability was important, but not a determining factor for a purchase.

Pelopac and GAEA have introduced these olive snack packs into several foreign markets, however, they have not proved to be as successful in the United States as anticipated. Currently, according to Pelopac, less than 1% of olives are sold in pouches in the United States.

This is supported by our survey findings which show that consumers in Massachusetts are unfamiliar with this packaging. Eighty-five percent of the respondents had not encountered the snack pouches, and, of the 15% that have, two-thirds would not consider purchasing them. Participants who said they would not buy the snack pouches believed that the packs were full of preservatives, had too few olives for use, or did not associate olives with a snack food. In actuality, the companies developing these snack packs use only natural preservatives such as salt and citric acid. This disparity between perception and reality suggests that consumers do not know enough about the pouches.

Furthermore, our research suggests that consumers highly value products without artificial preservatives and additives. Forty-seven percent of the sample size indicated this factor is very important when considering purchasing olives. Greek companies seem to be very proud of their natural product in the pouches; however, we strongly believe that the factors that make the olive snack pouches special have not been communicated adequately in the U.S. market or described on the label. Consequently, many Americans are not aware of all the benefits this sort of packaging has to offer, as indicated in Figure 4.23.

From the three interviews conducted, it is apparent that the Greek olive industry is able to adapt processes and marketing techniques to appeal to different markets. Yet, even though these companies possess the ability to change, they lack knowledge of American olive consumer preferences.

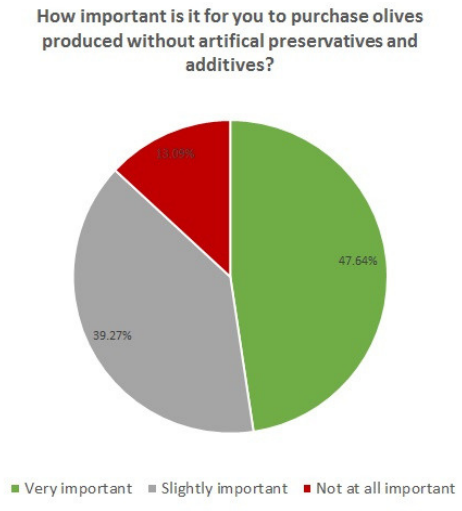

Figure 4.23: Importance of the Absence of Artificial Preservatives and Additives

Assess the challenges that Chalkidiki olive producers encounter when exporting to the U.S.

MARKET INTELLIGENCE

One of the main challenges for Greek companies exporting olives to the U.S. market is the limited knowledge about consumer preferences and perceptions of olives. Part of this reason is structural. Third party processors and exporters like Pelopac rely on their partners in the U.S. for information about U.S. market and consumer olive preferences. Gathering additional data on consumer preferences and evolving market segmentation is important to companies like Pelopac where 60-70% of total business is from the American market.

Market intelligence is also crucial to GAEA, whose market share is split into 82% exports and 18% in the domestic market. The company has established a North American headquarters to actively increase brand recognition and expand sales, in addition to learning more about American consumer preferences.

MAINTAINING PRODUCT QUALITY

Providing customers with a consistent high-quality product poses several challenges. The most significant threat to olive quality is the weather; cold winters can yield poor crops and too little rain, in the absence of irrigation, will produce a smaller olive, less valued than the larger Chalkidiki olive. To minimize variability, (e.g. appearance, texture, size, price) in their olive products, some Pelopac's customers, including major distributors in the U.S. and large supermarket chains, substitute Chalkidiki olives with Spanish olive varieties when the Chalkidiki olive became too expensive or experienced a decline in quality. To maintain the ability to make this change, many sellers of Chalkidiki olives in the United States label these products as only green olives. This marketing strategy explains the absence of the apparent Chalkidiki olives in United States stores.

However, some of Pelopac's other products packaged as premium brands did not employ this business model. Despite the continued use of Chalkidiki olives, limited packages sold in the U.S. were labeled as Chalkidiki. When questioned about this, both GAEA and Pelopac stated that the Chalkidiki olive variety was unknown by American consumers. This is corroborated by our survey results where only 1% of respondents reported that they were familiar with Chalkidiki olives.

We learned from our interviews that 70% of American consumers in the U.S. do not recognize any other place of origin for olive oil apart from Italy whereas for olives, almost 50% of American consumers believe that Greek olives are good, or even the best. Labeling Chalkidiki olives might, therefore, help consumers to recognize the region and associate it with the quality olives it produces, thereby adding value to the product. According to our interviews, Pelopac stated that origin identification is one of the most influential means of creating a premium product perception. We found that of the survey respondents with a preference for region, 53% preferred Greek table olives.

Finally, when asked what differentiates Chalkidiki olives from other olives, GAEA claimed it is the big size of the olive, the quality of the product, and the fact that Chalkidiki olives have half the calories of Kalamata olives. According to the company, this is a selling point that, especially in healthy snacks, attracts consumers and concurs with our survey results. Seventy-five percent of the survey participants considered olives to be healthy and this could be a potential selling point for Chalkidiki olives.

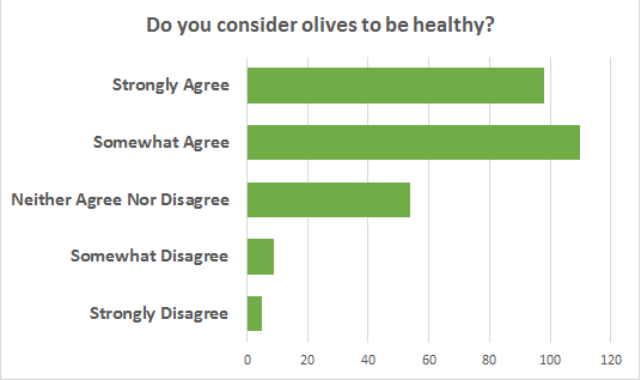

Figure 4.24: Perception of Olives as a Healthy Food

Limitations

Since this study was conducted under time constraints and without extensive resources, there are some limitations to the conclusions that can be drawn from the presented data. The taste test panel had limited training from a member of the International Olive Council. For many participants, this was their first experience tasting olives according to this metric. The sample selected was 93% Worcester Polytechnic Students and faculty, which does not represent the more diverse population of Massachusetts. Although the training helped participants recognize key characteristics of each of the five olives, the participants did not comprise an expert panel, as is suggested by the wide spread of the sensory measurements. Further testing would be necessary with a veteran group of olive tasters to create definitive sensory maps for these olive varieties.

For the pile sorting exercise, the participants were part of a convenience sample. The majority of the participants were students at WPI between the ages of 20 and 21. This means that our sample may not necessarily represent the attitudes about olive packaging of a more diverse population.

In regards to the survey, our demographic results show that the sample is not representative of the entire population of Massachusetts. As of the 2015 census estimates, Massachusetts residents were split up by the following demographics: 11.2% were Hispanic or Latino, 8.4% were Black or African, and 6.6% were Asian American. Additionally, the population of Massachusetts is 51.5% female and the median household income is $68,563 (U.S. Census Bureau, 2015). These distributions were not accurately represented in our survey population. Most of the respondents were white (89%) and a majority were female (66%). Also, most were over the age of 30 (73%) and the household income exceeded $100,000 (55%).

Finally, our interviews were limited to three companies, where one was a medium olive producer farm, whereas another was a processor and exporter, and the third one was a processor and packager. The challenges that these companies faced could be entirely different from those faced by smaller firms only starting to export, which means the results of this report may not fully capture the economic environment in which these smaller companies operate.

CONCLUSIONS

CHAPTER FIVE

Characterizing Consumer Preferences

Consumers have different attitudes when it comes to buying olives they already know to those that are new to them. When deciding to buy known types of olives, consumers that took our survey consider taste, freshness and price to be the most important factors. When considering buying a new olive, the appearance, price, and absence of artificial preservatives and additives were the most important factors. The importance of these factors as reported by respondents suggests that olive producers should attempt to market products matching these specifications. For example, our survey determined that Americans strongly preferred a dark green olive compared to a yellow green, explaining that the darker green olive appeared “fresher” and “tastier” whereas the yellow green was described as “sickly”. This appearance attribute can be altered readily and has already been implemented to target different markets.

We found that different types of consumers have different olive consumption habits and preferences. Adventurous consumers like to try new things, enjoy eating food with friends, and are more interested in food quality than consumers in other segments. This segment of the table olive market are the most likely segment to buy olives. Moreover, these people accounted for the 100% of the survey respondents who would buy olive snack pouches. Due to their olive consumption patterns and their desire for innovation, adventurous food consumers could be the primary potential target segment. This important finding raises some further questions for processors and producers:

1. How can Greek companies work more effectively with U.S. importers and U.S. distributors to better characterize different types of consumers for olives?

2. How do trends in food retailing influence where potential consumers buy olives?

3. In what way can olive snack pouches become more visible to American consumers, and how can the large ‘real estate’ on the package be used to promote the health benefits of this type of product?

4. In what ways can the continuing interest in healthy eating and the Mediterranean diet be used to promote Greek table olives, and the Chalkidiki brand as a snack food?

Packaging Preferences

We found an interesting connection between the type of consumer and different types of packaging. Adventurous consumers are more likely to purchase snack pouches or olives from olive bars than any other customer segment. The rational consumers, the second largest olive consumer segment in our survey, are more likely buy olives from a glass jar, a can, or claimed to not have a preference. The survey results revealed that the most popular olive packaging overall is glass jars.

The packaging that was repeatedly identified as that of the highest quality was the glass jar with a paper label wrapped in twine. Packaging that is artisanal in appearance is therefore recommended in order to promote perceptions of a high-end, quality product.

We also learned that almost half of our olive consumer sample was concerned with the artificial preservatives and additives added into their product: 44% of the respondents cared about the health claims of the product and 35% responded that the country origin would affect their purchasing decision. Based on these results, we believe that consumers would be more willing to buy this product if the packages could:

1. Make definitive claims about the health benefits of consuming olives.

2. Highlight the omission of artificial preservatives and additives.

3. Include the country of origin of the olive on the packaging.

Promoting the Chalkidiki Brand

When Chalkidiki olives are exported to the United States, the American brand owners are reluctant to label them as such. We have learned that the Chalkidiki label is barred from certain packages so that the product is kept generic and flexible to variations within the olive market, such as Pearl's Cannonball olives. However, since American consumers from our survey indicate that they prefer Greek olives, and we also have learned that region of origin labels premiumize a product, we have several questions that should be explored in future research regarding the absence of labeling.

1. What other reasons, besides substitution of olives, is there for not labeling Chalkidiki olives as such?

2. Even if a consumer doesn't recognize Chalkidiki on the label, will that deter them from buying the product?

3. Does the labeling of Chalkidiki increase the price of the product sold?

Final Thoughts

The Chalkidiki olive presents a unique set of challenges to companies trying to capitalize on the growing market and this report can only cover so many facets of the industry. We believe the challenges faced by smaller companies is an interesting field that should be further explored in future research, as their business environment would be radically different from the larger companies that this report focused on. Additionally, the preferences of Massachusetts may be different from other states within the U.S., so expanding the scope of research to encompass a group of states rather than one may create a better sense of consumer segmentation.

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APPENDIX A

TASTE TEST QUESTIONNAIRE

Rate Categories from 1-9

9-Point Hedonic Scale	
9	Like Extremely
8	Like Very Much
7	Like Moderately
6	Like Slightly
5	Neither Like nor Dislike
4	Dislike Slightly
3	Dislike Moderately
2	Dislike Very Much
1	Dislike Extremely

	APPEAL
PERCEPTION OF NEGATIVE SENSATIONS	
Abnormal fermentation (type)	_____
Other defects (specify)	_____
PERCEPTION OF GUSTATORY SENSATIONS	
Salty	_____
Bitter	_____
Acid	_____
PERCEPTION OF KINAESTHETIC SENSATIONS	
Hardness	_____
Fibrousness	_____
Crunchiness	_____
OVERALL APPEAL	_____
WOULD YOU BUY THIS OLIVE (Y/N)?	_____
Olive Sample	_____

APPENDIX B

OLIVE PREFERENCES AND CONSUMPTION SURVEY

Q1 What is your age?
- o 18 - 24
- o 25 - 30
- o 31 - 40
- o 41 - 50
- o 50+

Q2 What is your ethnicity?
- o White
- o African American
- o Hispanic or Latino
- o American Indian or Alaska Native
- o Asian
- o Native Hawaiian or Pacific Islander
- o Other _____

Q3 What is your gender?
- o Male
- o Female
- o Other

Q4 What is your estimated household income?
- o < $20k
- o $20 - 34k
- o $34 - 49k
- o $50 - 74k
- o $75 - 99k
- o $100 - 149k
- o $150k+

Q5 What is your highest level of education?
- o Less than high-school
- o High-school or equivalent
- o Some college without degree (Students)
- o Associates Degree
- o Bachelors Degree
- o Masters Degree
- o Ph.D

Q6 There are five different categories of food consumer identified by previous studies. Please read the following table and answer the questions below.

Types	Description
Adventurous	· I am interested in all quality aspects of food. · I view food as a social experience and enjoy eating with friends at home and outside home. · I like to try new things and I am always up for a new brand/different product.
Carefree	· I am not interested in shopping for food and have little or no interest in cooking, much less in planning food related tasks. · I am often time-pressured, and prefer to cook quick, convenient meals.
Conservative	· I am uneager to try new foods and I prefer to stick with what I know. · Organic foods and anything new is least interesting to me.
Rational	· Self-fulfillment in food is important to me. · I like preparing meals and value all quality aspects of food. · I plan shopping and meals, I often read advertisements and product labels. · I think that price is the most dominant aspect when making food decisions.
Uninvolved	· I am mostly uninterested in anything related to food

Q7 What sort of food consumer do you identify as MOST of the time?
- o Adventurous
- o Carefree
- o Conservative
- o Rational
- o Uninvolved

Q8 How often do you buy olives?
- o Weekly
- o Monthly
- o Only for special events
- o Never

Q9 Where do you typically buy olives?
- o Supermarkets (ex. Shaws, Star Market)
- o Discount Retailers (ex. Wal-Mart, Costco)
- o Specialty Retailers (ex. Trader Joes, Whole Foods)
- o Delicatessen
- o Convenience Store
- o Other: (Please Specify)

_____

Q12 What packaging do you prefer to buy olives in?
o In a can
o In a glass jar
o In a snack bag
o In an olive bar so I can package them myself
o Other: (Please Specify)

_____
o No Preference

Q13 What varieties of green and/or black olives are you familiar with? Please list them below separated by commas.

Q14 If you have a preference for a certain country of origin when it comes to olives, what is it?
o Italy
o Spain
o Greece
o United States
o South America
o Other: (Please Specify)

_____
o No Preference

Q15 Have you noticed Greek olives in stores when you shop?
o I have seen them everywhere I shop
o I only find them in specialty stores
o I only find them in specific supermarkets
o I have found them in other stores (Please Specify) _____
o I have not

Q16 How do you feel about the following statement:

	Please choose one				
	Strongly Disagree	Somewhat Disagree	Neither Agree Nor Disagree	Somewhat Agree	Strongly Agree
Olives are a healthy food.					

Q17 Do you consider olives as a snack food?
o Yes
o No
o I would need further nutritional information

Q18 Have you noticed snack pouches (example picture shown above) of olives in your visits to the grocery store?
o Yes, I buy them
o Yes, but I do not buy them (Please briefly explain why) _____
o No, I have not seen those

Q19 Which olive appeals to you most and why?
o A _____
o B _____

Q20 How important is it for you to purchase olives produced without artificial preservatives and artificial additives?
o Very important
o Slightly important
o Not at all important

Q21 How often do you read packaging labels and information?
o All the time
o Sometimes
o Never

Q22 Please rate the following factors on how much they would motivate you to purchase an unknown type of olive.

	Definitely will not	Probably will not	Might or might not	Probably will	Definitely will
Packaging Aesthetics					
Country of Origin					
Price					
Health Claims					
Environmentally Sustainable Production Practices					
Appearance of Olive					
Organic or Non-GMO Certification					
Free of artificial preservatives					
High nutritional value					

Q23 Assuming the price were the same, how willing would you be to try a new variety of olive?
o Definitely willing to try
o Probably willing to try
o Might or might not be willing to try
o Probably not willing to try
o Definitely not willing to try

Q25 How important is resealable packaging to you when are considering purchasing olives?

- o Very important
- o Important, but not a determining factor
- o Not important
- o No preference

Q26 Please drag and drop the items into the box below by rating the following attributes from most important to least important (1 being the most important).

	Definitely will not	Probably will not	Might or might not	Probably will	Definitely will
Packaging Aesthetics					
Country of Origin					
Price					
Health Claims					
Environmentally Sustainable Production Practices					
Appearance of Olive					
Organic or Non-GMO Certification					
Free of artificial preservatives					
High nutritional value					

Q25 How important is resealable packaging to you when are considering purchasing olives?

- o Very important
- o Important, but not a determining factor
- o Not important
- o No preference

Q26 Please drag and drop the items into the box below by rating the following attributes from most important to least important (1 being the most important).

APPENDIX C

CHALKIDIKI OLIVE PRODUCER INTERVIEW SCHEDULECHALKIDIKI OLIVE PRODUCER INTERVIEW SCHEDULE

Schedule
Producer/Processor
Introduction
Overview of Farm or facility
How long have you been cultivating olives?
How large is your farm?
What varieties of olives do you cultivate?
What is an average yield for you?
What goals do you have for the future?
What do you do here to make it a “Chalkidiki” olive?
How do you decide what cultivation techniques to use (traditional, intensified traditional, or intensive modern)?

Olive Processing

What sort of brining processes do you utilize? Can these brining processes be used to change the taste, texture and aroma of the final product?
How can you adapt your olives to different markets domestically and abroad?
How does the EU and Greek government assist you in producing olives?
Who you do you see as your competition? Other Greek farmers? Other nations?
What challenges have you faced within the American market?

Market

How much volume of olives do you export currently (if applicable)?
What our data from overseas indicated was that Americans did not see the “hook” or story attached to the Chalkidiki olive. How would you explain the significance of this olive to us?
How would you rate the importance of exporting to the American market? Why?
What motivations do you have to try to export to the U.S.?
What strategies do you use to differentiate your products from others?
What foreseen challenges do you face as an olive cultivator in the market?
What differences do you perceive between the United States and European markets?

Chalkidiki Olive Exporter Interview

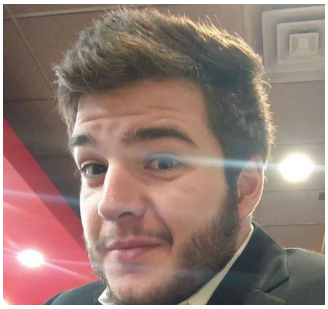
Greek Olive Industry
What types of olives do you process and export here?
How many farms are selling their olives to you?
What are the characteristics of these farms in terms of cultivation practices?
Which farms do you purchase from the most and why?
Once the olives finish here, where do they go? Who buys them from you?
What quantities do you send to them?
What markets do you export to?
Are there any perceived differences within those markets?
Who makes the final packaging and labelling decisions?
What factors drive those decisions?

Market and consumer preferences

Who are your competitors? Other Greek franchises? European nations?
What do you know about consumer preferences in foreign markets, specifically the United States?
Where do you obtain this knowledge?
How can you adapt your olives to different markets domestically and abroad?
How do you know what those different markets desire?
What sort of brining processes do you utilize? Can these brining processes be used to change the taste, texture and aroma of the final product?
How much volume of olives do you export currently?
What our data from overseas indicated was that Americans did not see the “hook” or story attached to the Chalkidiki olive. How would you explain the significance of this olive to us?
What foreseen challenges do you face as an olive exporter?
What are some of the challenges you face entering the United States markets?

AUTHORSHIP

Luciana Alvestegui, Andersen DeRosier, Cassondra Dale and Andonios Kouninis all contributed to the research, data collection, analysis and writing of this study. Every member wrote individual sections of this report, and then edited the paper in terms of grammar, content, and overall flow of the study. The following is a breakdown of how the report was written for this project.



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